DRE-93

DRAFT – Clad Model and Its Applications

FOY

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ABSTRACT

The CLAD model is an abbreviation for concentrations, loadings and discharge model. This model was developed to estimate future basin discharges and concentrations of conservative chemical constituents for these discharges. It is a simplistic mass balance model for both quantity and quality. Output is on a monthly basis. The model is deterministic and is rainfall driven. It requires historical discharges for the period of record to be analyzed. The mass balance computations call for the January 1975 version of the Corps of Engineer's STORM model (STORM stands for storage, treatment, overflow and runoff model).

The STORM requires hourly rainfall, land uses and their corresponding pollutant loading rates along with some general basin description parameters.

The CLAD model estimates future discharges by (a) calculating the historical groundwater contributions to discharges (i.e., by subtracting surface runoff of the STORM model from the historical discharges), (b) accounting for changes in groundwater evapotranspiration and surface water evaporation, and (c) adding the net groundwater contributions to the surface water runoff estimated from STORM.

As a part of water quality calculations, the CLAD model estimates the net amount of water quality concentrations from all the historical nonpoint sources and sinks by subtracting surface runoff contributions (as estimated by the STORM model) from the historical water quality data. These monthly concentrations are assumed to be constant in the analysis until further definition can be made. In other words, both historical and future concentrations for all sources and sinks (other than surface water) are assumed to be equal. Using surface runoff, groundwater flow contributions, the surface runoff quality, and quality of the nonpoint sources and sinks, the CLAD model estimates the future water quality of basin discharges.

1. INTRODUCTION

There were several water resources planning alternatives that were considered by the South Florida Water Management District while preparing its Water Use and Supply Development Plan for the Lower East Coast Planning Area in South Florida. One of these alternatives is known as the backpumping scheme, where normal eastward flow of excess water to the Atlantic Ocean is reversed by pumping it westward to the conservation areas to increase the water supply capability for the regions of south Florida during the dry period (November through April). This backpumping alternative has several elements associated with it. These elements (including technical, economic, water quality factors, etc.) need to be thoroughly analyzed before an overall impact of the backpumping alternative is assessed. One of the useful inputs is related to the estimation of both quantity and quality of the canal water that will be backpumped to the three conservation areas. In other words, this is a situation where the estimation of the water quantity and quality for future land use scenarios is required at the current time. This type of situation, which is often encountered in water resources planning, demands a reliable mathematical model. To fulfill such a need, the CLAD model was designed. The primary purpose of the CLAD model, as described in this report, is to estimate the quantity and quality of backpumped water that is received from the drainage basin of three lower east coast canals (West Palm Beach Canal basin (C-51 basin), Hillsboro Canal basin and Tamiami Canal basin (C-4 basin)). It should be noted that the model is set up in a manner that is consistent with two other District models: the linear optimization model which analyzes different elements of the backpumping scheme but utilizes the output of the CLAD model and the water quality model. These backpumping alternatives call for building surface water control structures to separate these basins into east and west subbasins, see Figures 1, 2,

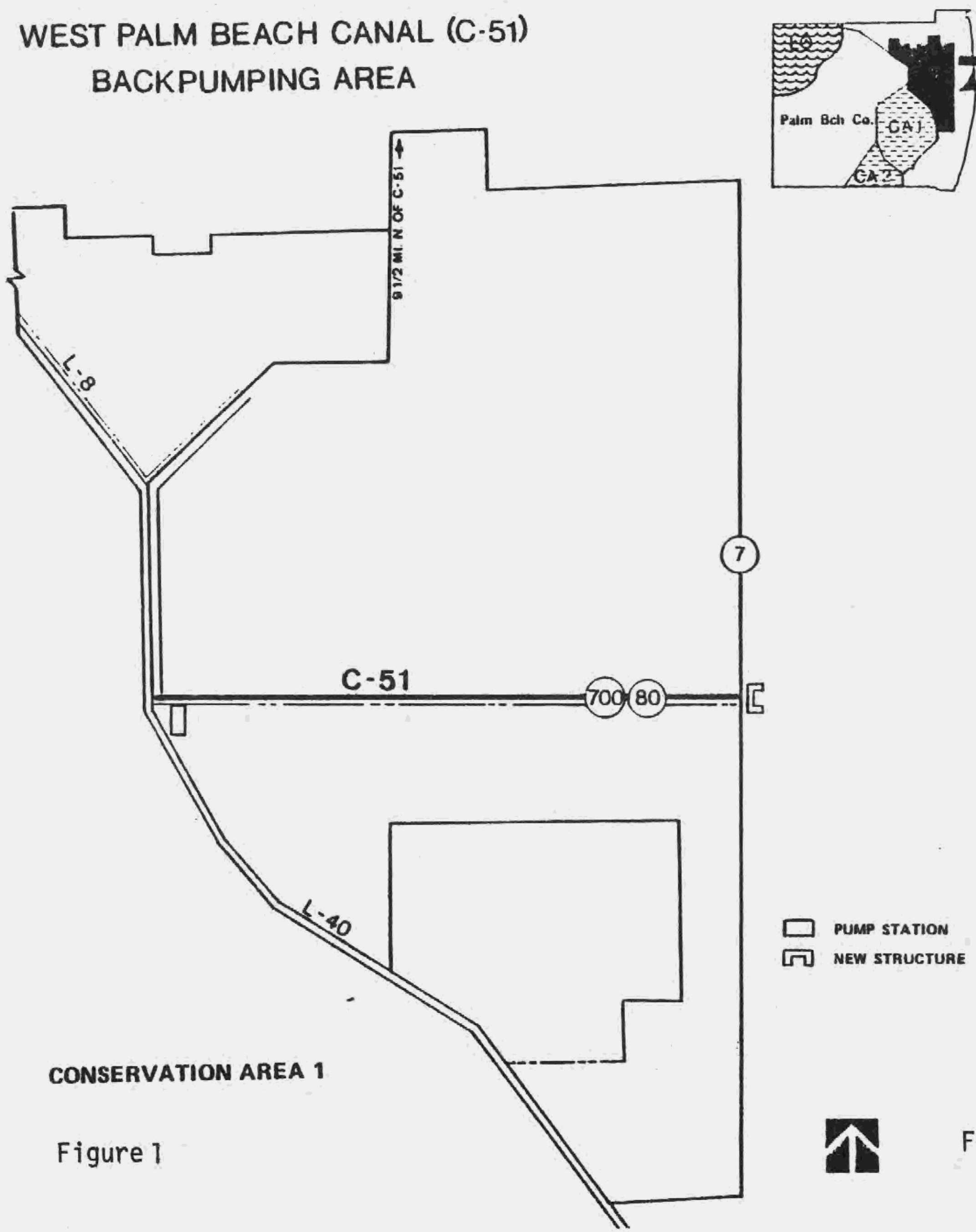


Figure 1

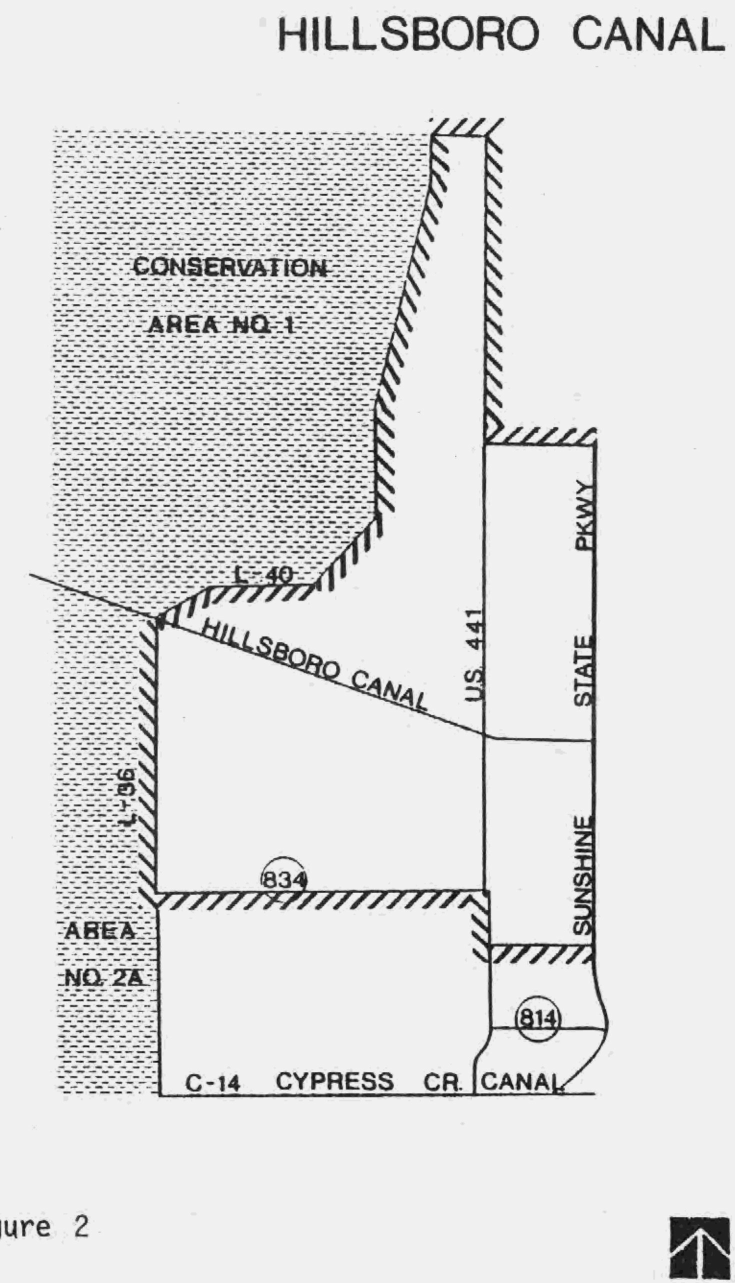
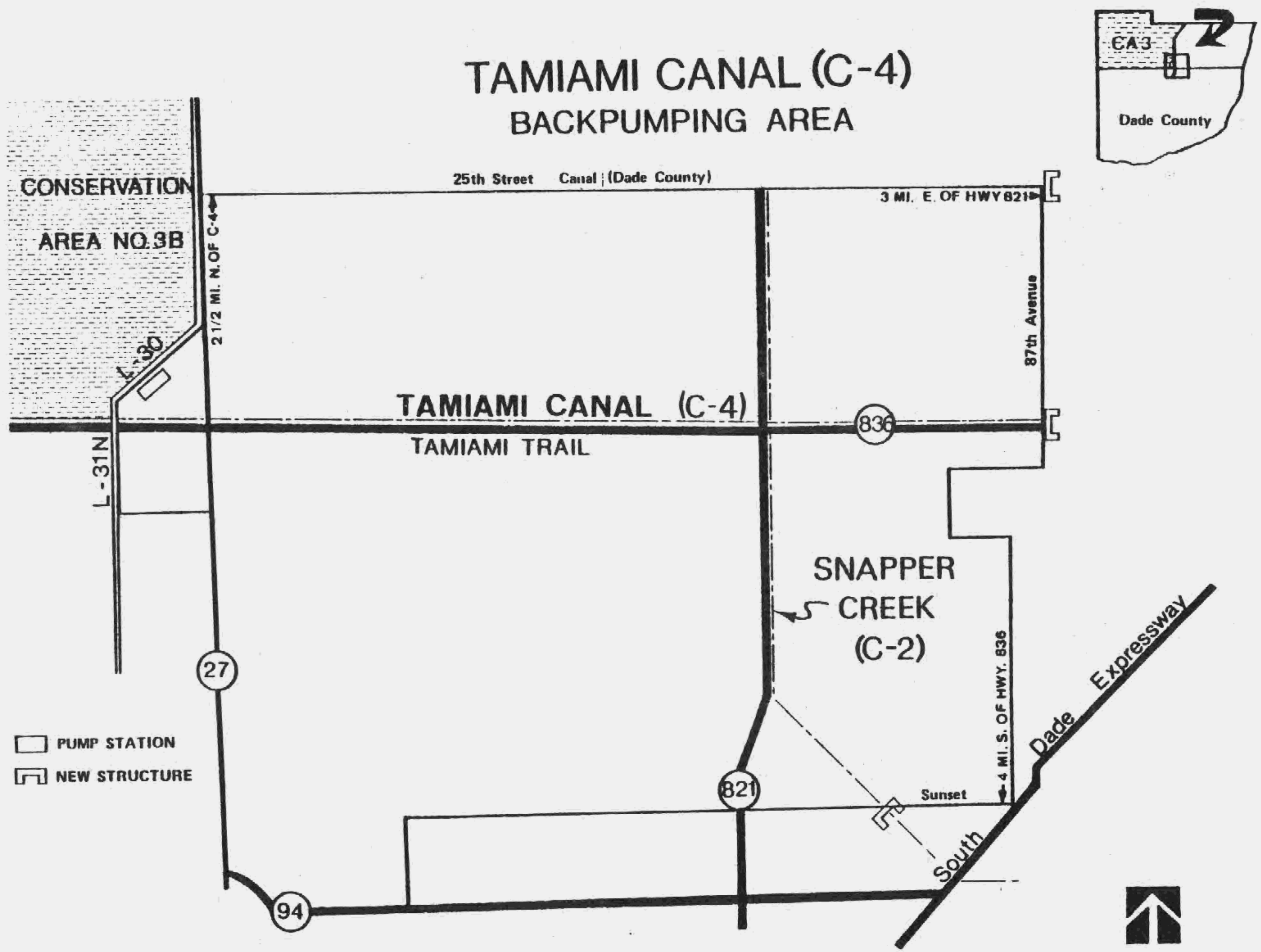


Figure 2



TAMIAMI CANAL (C-4)
BACKPUMPING AREA
CA3
Dade County
25th Street Canal (Dade County)
3 MI. E. OF HWY 821
CONSERVATION
AREA NO.3B
2 1/2 MI. N. OF C-4
L-30
87th Avenue
TAMIAMI CANAL (C-4)
TAMIAMI TRAIL
836
L-31N
SNAPPER
CREEK
(C-2)
4 MI. S. OF HWY. 836
27
Dade Expressway
PUMP STATION
NEW STRUCTURE
821
Sunset
South
94

Figure 3

and 3. The east basins would still discharge to tidewaters, while the west basins would be totally or partially backpumped to the Conservation Areas (see Figure 4).

2. DESCRIPTION OF THE CLAD MODEL

Basically, the CLAD model (CLAD stands for concentrations, loadings and discharge) has the following three major components:

1. The Discharge model
2. The STORM model
3. Quality calculations

These components are discussed below:

2.1 THE DISCHARGE MODEL

Using a water balance approach on a monthly basis, the discharge model estimates future discharges from the following equations:

$$\text{Inflow} - \text{Outflow} = \text{Storage Change} \quad (1)$$

Using various inflow, outflow and storage entities, equation (1) is rewritten as shown below:

Rainfall (R) - Discharge (DIS) - Surface Water Evapotranspiration (SWET) - groundwater evapotranspiration = groundwater outward seepage - groundwater inward seepage + depression storage evapotranspiration (DSET) + groundwater storage change (includes surface water storage change)

Surface water storage was considered an extension of the groundwater system. The basins modeled have controlled surface water (canal) elevations.

Combining groundwater terms together, we define:

net groundwater loss (NGWL) = groundwater outward seepage - groundwater inward seepage + groundwater storage change + groundwater evapotranspiration (3)

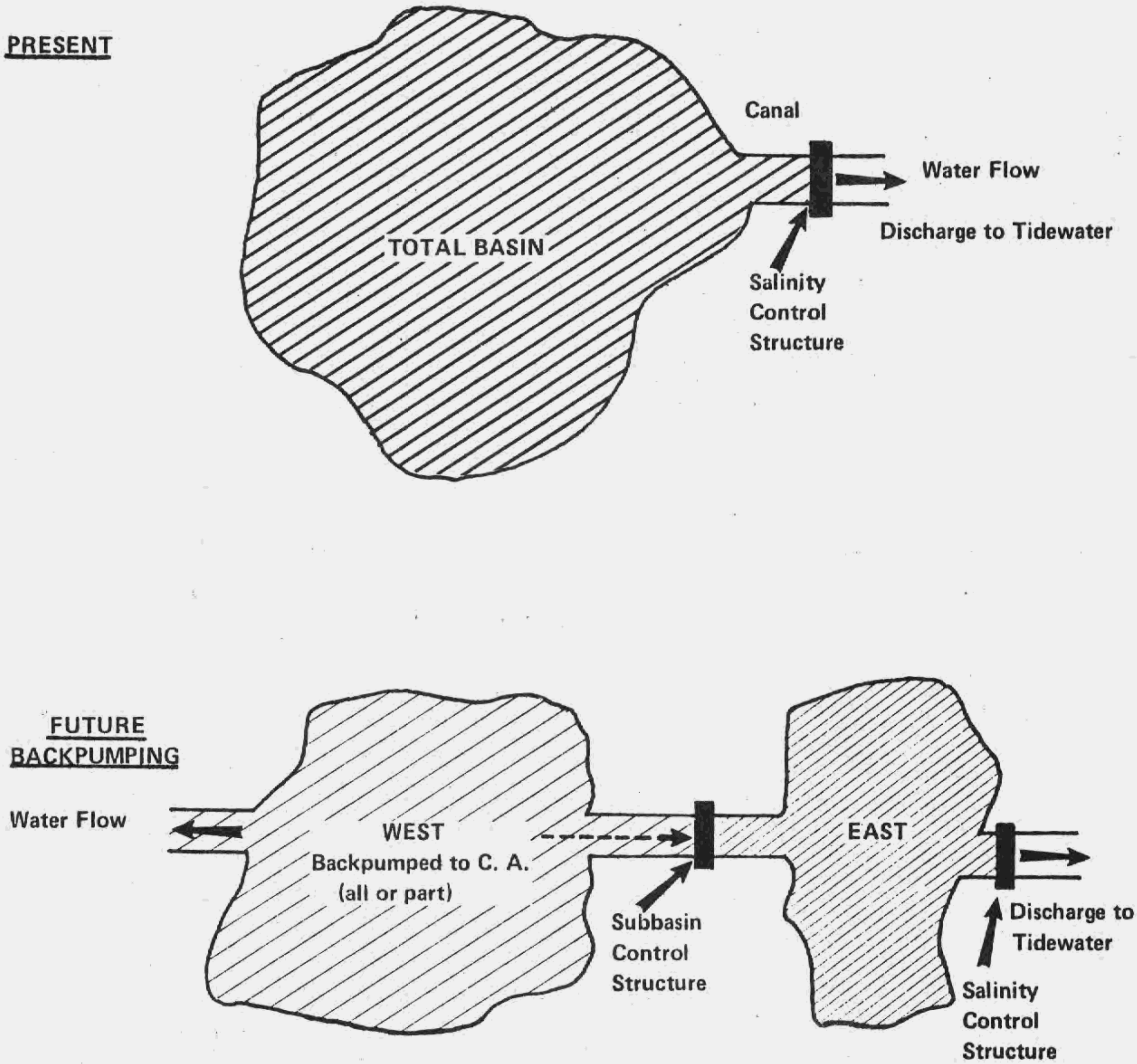


FIGURE 4

SCHEMATICS OF THE BACKPUMPING ALTERNATIVE

This simplification provides us with the following water balance equation

$$R \doteq DIS + DSET + SWET + NGWL \tag{4}$$

where

R = Rainfall data largely obtained from United States Weather Bureau data,

DIS = Surface water discharge of the basin obtained from United States Geological Survey water supply papers,

SWET = Evapotranspiration from surface water which is determined by multiplying monthly potential evaporation rates by the evaporation coefficient and area of open surface water.

NGWL = Net groundwater loss which is estimated

DSET = Evapotranspiration from depression storage. This is calculated using the following equation:

$$DSET = R - (Runoff)/(C) \tag{5}$$

where

R = hourly rainfall

Runoff = hourly runoff computed by STORM model

C = Area weighted runoff coefficient. (This coefficient can be computed as weighted average of various land uses).

Using present combinations of land use related input data and observed sets of rainfall (R) and discharges (DIS), net groundwater losses for a historical case are estimated by

$$NGWLH \doteq R - DISH - DSETH - SWETH \tag{6}$$

where

NGWLH = Net groundwater loss for historical case

R = Rainfall (as before)

DISH = Historical discharge

DSETH = Evapotranspiration from depression storage for historical case,

SWETH = Evapotranspiration from surface water for historical case.

It is to be noted that Equation 6 is a rearrangement of Equation 4 and H is added to the end of every term to represent the historical case.

The discharge model estimates future discharges in the following steps (Please note that F is added to the end of every term of the mass balance Equation 4 to represent future condition).

(1) Use the same rainfall record as was used for the historical case

(2) Assuming that future groundwater losses decrease as the impervious cover increases, future net groundwater losses (NGWLF) are estimated by

$$\begin{aligned} NGWLF &= NGWLH/(1+IFI) \quad \text{if } NGWLH > 0 \\ \text{and} \quad & \\ NGWLF &= (NGWLH)(1+IFI) \quad \text{if } NGWLH < 0 \end{aligned} \tag{7}$$

where

$$\begin{aligned} IFI &\doteq \text{Increase in impervious fraction} \\ &= \sum_{i=1}^{N} [(IF_i)(Area_i)/\text{Total Area}]_{\text{future condition}} \\ &- \sum_{i=1}^{N} [(IF_i)(Area_i)/\text{Total Area}]_{\text{historical condition}} \end{aligned} \tag{8}$$

and IF_i = Impervious Fraction for land use i

(3) Estimate Evapotranspiration from depression storage for future conditions (DSETF) using Equation 5.

(4) Evapotranspiration from surface water (SWETF) is a model input

(5) Compute future discharges (DISF) by plugging all the known terms of the righthand side of the following equation:

$$DISF = R - DSETF - SEWTF - NGWLF \quad (9)$$

(6) The nonpoint discharge (ONPSQN) is finally estimated as

$$ONPSQN = DISF - \text{Surface runoff} \quad (10)$$

The discharge model is summarized in Figure 5.

Surface runoff is computed by the STORM model which is briefly described in the following section.

2.2 STORM MODEL

The STORM (storage, treatment, overflow and runoff) model is a mathematical model developed by the United States Army Corps of Engineers for estimating quantity and quality of surface runoff. There are several versions of STORM. In this report, the January 1975 version is used. STORM has the following two computational steps which are subsequently used by the CLAD model.

A. <u>Surface runoff quantities:</u> The runoff contributions from urban and nonurban areas are computed by the following equation:

$$R_s = C_u(P - ADS_u) + C_n(P - ADS_n) \quad (11)$$

where

R_s = surface runoff (to be estimated)

C_u = urban runoff coefficient

This coefficient is estimated by taking the weighted average of pervious and impervious runoff coefficients for each of the five land uses (single family, multiple family, commercial, industrial and open space) with their respective percentages of urban area and imperviousness.

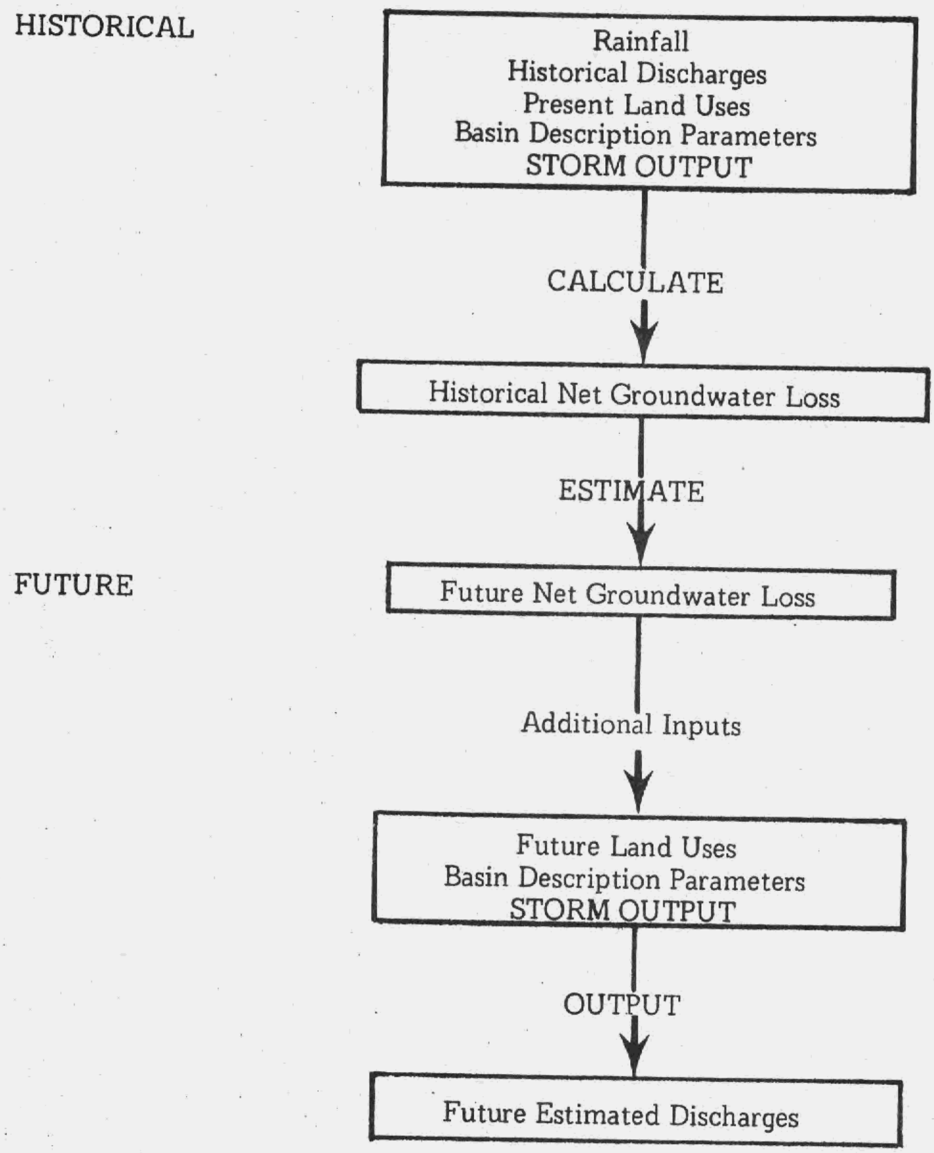


FIGURE 5

A Flowchart of the Discharge Model

P = Hourly rainfall

ADS_u = Available urban depression storage. This is a function of depression storage and evaporation rate which are input parameters.

ADS_n = Available nonurban depression storage

B. Storage Runoff Quality: The pollutant runoff form of the equation is

$$\text{Washoff} = P_o(1 - e^{-KR_s}) \tag{12}$$

where

Washoff = Pollutant washed off by the rainfall in pounds,

P_o = Initial pounds of pollutant on the basin

K = Washoff coefficient (an input value)

R_s = Surface runoff (computed from Step 1)

The five pollutants considered in the January 1975 version of STORM for both urban and nonurban land uses are suspended solids, settleable solids, biochemical oxygen demand (BOD), nitrogen and phosphorus. The solids and nonurban loadings are independently calculated, however, the urban BOD, N and P washoffs are dependent on urban solids washoffs. This dependence can be annuled by inputting very small accumulation rates for urban solids (not zero since STORM has default values)

Street sweeping and its efficiency in reducing the amount of pollutants accumulated is an additional option available in these surface runoff quality computations.

2.3 QUALITY COMPUTATIONS

The following steps are involved in the water quality analysis.

1) Using at least one year of monthly water quality data coupled with monthly discharge data, monthly nonpoint loadings from the basin are computed. Any point source contributions during the data collection period must be deducted.

The term "data collection period" is also referred to as "data base period" in this report. The nonpoint loadings computed in this step are also known as historical loadings which include surface runoff loadings and loadings from other nonpoint sources and sinks. These calculations are done before CLAD model is run.

2) Estimate the surface runoff loading by using STORM for the data base period. To do this, first run STORM and STORM SUM (a program in CLAD model to sum up surface runoff on monthly basis), and second calibrate STORM output to the data above by trends (loadings and/or concentrations versus time) and the maximum limits (discharge loadings).

3) Knowing the total historical loadings and quantities from Step 1 and calculating the surface runoff loadings and quantities from Step 2, the quantities and loadings of other nonpoint sources are obtained by subtraction. Other nonpoint sources and sinks concentrations can then be calculated. An iterative procedure is employed by the user to find the best data fit with output from Steps 1 and 2.

4) Using the computed other nonpoint source concentrations and projected land uses, the CLAD model provides quantity and quality (loading and concentrations) for future scenarios.

The parameters most effective in quality calibrations are the exponents for dust and dirt washoffs and the pollutant accumulation rates. Runoff coefficients and depression storage also affect quality outputs, but they affect quantity much more.

The CLAD model is also designed to reduce future urban loadings by expected pollutant removal efficiencies. These removal efficiencies are model inputs for the entire urban area. They were calculated for grassed swale drainage and detention basins as follows:

$$REFF = [(EFFGS)(FRACGS) + [1-(EFFGS)(FRACGS)](EFFDB)(FRACDB)](NDUA/TFUA) \quad (13)$$

where

REFF = Removal efficiency for future urban areas

EFFGS = Removal efficiency for grassed swales,

FRACGS = Fraction of area in newly developed urban areas to have grass swales,

EFFDB = Removal efficiency of detention basins,

FRACDB = Fraction of area in newly developed urban areas to have detention basins,

NDUA = Newly developed urban area,

TFUA = Total future urban area.

2.4 CLAD MODEL OUTPUT

The CLAD model with its preceeding three components produces the following output which has 11 output sections:

(1) List of input, an echo print excluding rainfall.

(2-4) STORM quality output for three land uses: present, future, and future urban. These outputs are identical to the STORM quality printout. They give, for each event (an event occurs when there is sufficient rainfall to cause surface runoff), rainfall, runoff, and pollutant washoffs in pounds.

(5-7) STORM SUM, monthly runoff quality summary from STORM plus depression storage evapotranspiration for the three land uses.

(8) Surface runoff concentrations for the three land uses.

(9) Other nonpoint sources and sinks quantities and loadings.

(10) Quantity output; listing monthly rainfalls and for present and future land uses: basin discharges, runoffs, depression storage evapotranspirations, surface water evapotranspirations, and net groundwater losses.

(11) Future basin discharged quality: monthly loadings and concentrations.

2.5 LIMITATIONS OF THE MODEL

The water balance is a gross estimation of how historical discharges change with future land uses. The CLAD model cannot be considered accurate for short term events (less than monthly for either quantity or quality). Therefore, neither flood analyses nor peak pollutant concentrations or loadings can be obtained through the use of the CLAD model. Appropriate use of the model is for long term or accumulative water quantity and quality effects on basin discharges for projected land uses. Such applications are, for example, regional water supply routings, seasonal storage analyses, and gross quantity and loading evaluations on downstream receiving waters.

There is a general lack of definition and knowledge concerning other non-point groundwater sources and sinks, and their variations. These monthly concentrations have been assumed constant from year to year. During high rainfall other nonpoint source concentrations would probably be lower. For low rainfall years, other nonpoint source concentrations would probably be higher, but the sinks may balance out the discharged loadings.

Future discharge predictions were made by assuming the net groundwater losses in a basin would decrease in proportion to the increase in impervious ground cover. This was assumed for simplicity, and because of the general lack of knowledge and complexities in predicting future groundwater mass balances. The assumption is most valid for small increases in impervious areas, non zero net groundwater losses, and when the net groundwater losses are dominated by groundwater evapotranspiration.

Increases in water demand must be considered separately. These discharge predictions don't include increased demands, or their effects on the groundwater system.

Quality predictions presently lack well defined, area sensitive, land use pollutant accumulation rates. However, they are initiated with Florida data (Nonpoint Source Effects, Wanielista), and then they are calibrated by limits and trends, as previously explained.

Presently this model doesn't include any mixing calculations. That is the water quality of surface runoff plus that of other nonpoint sources and sinks is equivalent to the discharged water quality, they are not mixed with the water stored in the conveyances. This causes little or no problems during the wet season, but it can cause high pollutant concentration predictions during the dry season. When surface runoff exceeds discharge, the pollutant loadings into into the canal will probably exceed the discharged loadings. In these cases the discharged quality is set equal to the surface runoff quality. In reality, during these periods the surface runoff is diluted by stored surface water, and some uptakes are likely. Mixing effects should be added to this model to adjust the high pollutant concentration predictions during the dry season, and to add temporal cohesion to the model.

The model is applied to canal drained basins. Canals are deep, narrow water conveyances, with little or no littoral areas. Canals are not conducive to biological activity. It is therefore easier to model canal discharged loadings because of their deficiency in natural pollutant sinks. For a natural watercourse, uptakes will become much more significant. This may require additional calibrations or program modifications in terms of ET changes, demand supplied, quality and mixing processes.

3. INPUT REQUIREMENTS

3.1 INPUT DATA

There are the following types of input data pertaining to (A) discharges (B) quality related concentrations (C) rainfall and (D) input information to STORM

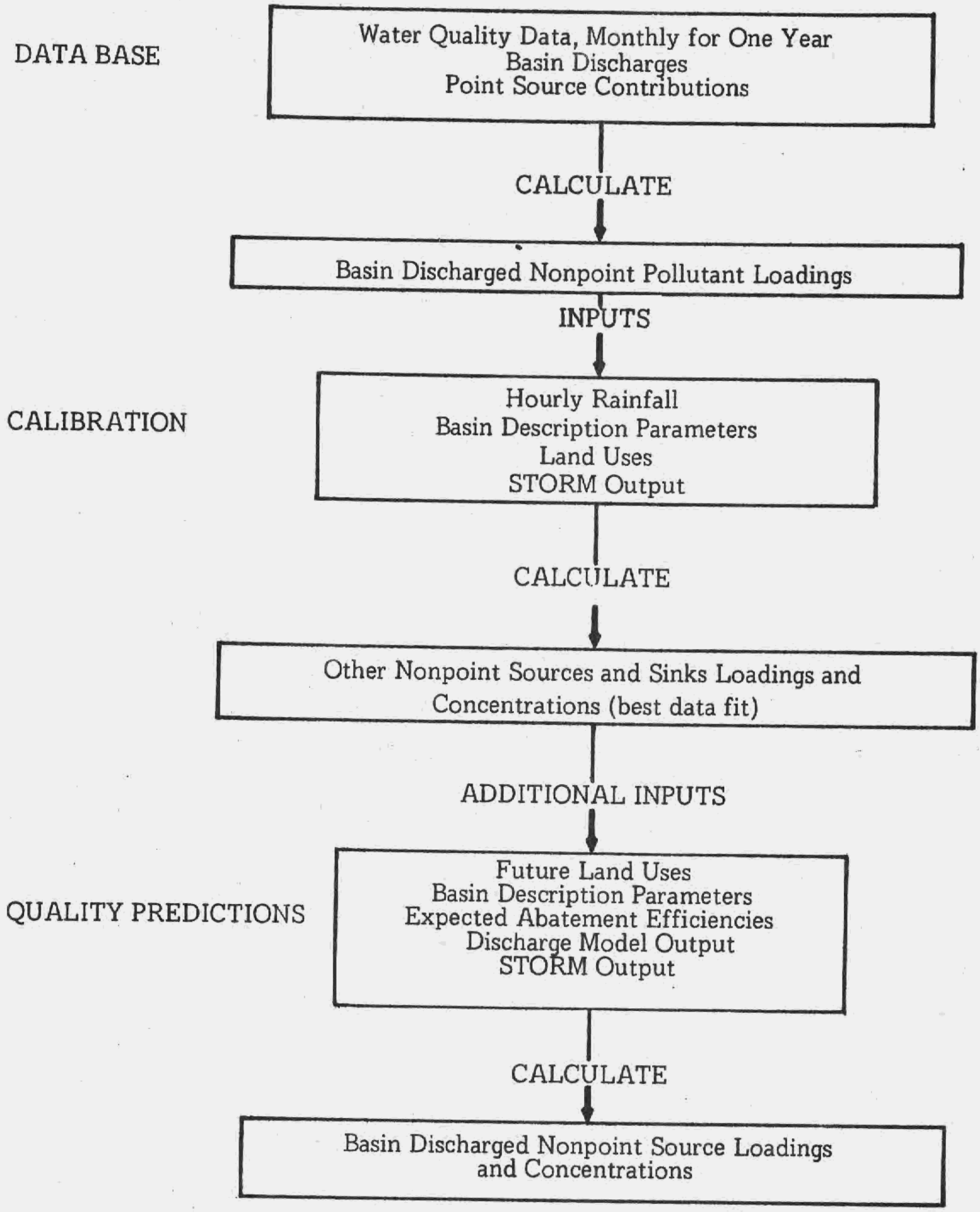


FIGURE 6

VARIOUS STEPS OF THE QUALITY CALCULATIONS for present, future and future urban land uses.

(A) Input Set Related to Discharges:

Variable	NO. Cards	Card	Card Columns	Descriptions
SWETH	2	1	1-7	Basin identification, must be identical to all other Basin ID's
			11-20,..., 71-80 (fields of ten)	Surface water ET for Jan. thru July, in Ac. Ft. assumed repetitive each year.
		2	1-7	Basin ID
			11-20,..., 51-60	Surface water ET for Aug. through Dec.
			71-75	Card ID "SWETH"
SWETF	2	Both		Same as SWETH for future
IFI	1	1	3-6	Increased fraction impervious, (see Equation No. (8))
			71-3	Card ID "IFI"
DISH	2 per yr.	1	1-7	Basin ID
			9-10	Year
			11-20,..., 71-80	Historical basin discharges for Jan. through July, Ac-Ft.
		2	1-7	Basin ID
			9-10	Year
			11-20,..., 51-60	Historical basin discharges for Aug. through Dec.
			71-4	Card ID "DISH"

(B) Quality Inputs:

Variable	NO. Cards	Card	Card Columns	Descriptions
(2) Quality ONPSCSS	2	1	1-7	Basin ID
			11-20,..., 71-80	Other nonpoint sources and sinks suspended solids concentrations for Jan. through July, mg/l
		2	1-7	Basin ID
			11-20,...,	as above for August through December
			71-77	Card ID "ONPSCSS"
ONPSCBOD	2			Same as above but for BOD
ONPSCTN	2			" " " " " Total Nitrogen
ONPSCTP	2			" " " " " Total Phosphorus
REFF	1	1	1-7	Basin ID
			11-20,...,	Future abatement efficiencies for total urban area. See equation (13), in order: SS, BOD, TN, TP: Input Fraction (0.50 not 50%)
			71-4	Card ID "REFF"

(C) Rainfall: The format is the same as STORM with the exception that the C2 card is omitted. Card or tape files may be used.

(D) Input to STORM: The format of input sets to STORM is given in details in reference No. 12. The CLAD model has restricted certain fields which are given below:

1) Omit rainfall data which is already included in section (C) above
2) On B1 card, field 1 must be 1 because CLADM is presently limited to one watershed per analysis.
3) On B1 card, field 2 must be 0 if a rainfall tape is used. The file reserved for snowmelt computations (Tape 11) is used for rainfall tape inputs. If both snowmelt computations and a rainfall tape are desired, another tape I/O unit must be reserved.
4) On C1 card, field 9 must be 1.
5) C2 card is omitted.
6) On E1 card, field 0, basin identification. This must be the same in columns 4-10 as in columns 1-7 of discharge and quality inputs. This is a check for data continuity.
7) Land uses must be put in order: present, future, and future urban. Future urban land use is identical to future, but input 0.0 on H1 card, field 1.

The calibration run is made with three land uses: present, present, and present urban. The abatement removal efficiencies and increased fraction impervious are set equal to zero.

3.2 INPUT DERIVATIONS

A. Pollutant Accumulation Rates for Surface Runoff

The land use loading rates (pollutant accumulations on land surfaces in lbs/acre/day) used in the backpumping studies are values published by Wanielista, et al, of Florida Technological University (FTU) modified to reflect five urban land uses. These loadings were used in STORM to estimate pollutant (SS, BOD_5, Total N, and Total P) loadings into primary drainage canals. The FTU loadings are published for both urban and nonurban land uses. The nonurban land uses are divided into cultivated, pasture, and woodland. The urban loadings were not subdivided by land uses as depicted in Table 1.

To more closely reflect urban land use loadings, the average urban loadings were subdivided into the following land uses: (1) single family, (2) multiple family, (3) commercial, (4) industrial, and (5) open space as shown in Table 2. Values in Table 2 are computed by weighing the land use loadings according to

TABLE 1

FTU Land Use Loading Rates*
(lbs/acre/day)

	BOD_5	Total Nitrogen	Total Phosphorus	Suspended Solids
Urban-Range**	0.130-0.200	0.00782-0.0440	0.00244-0.0122	1.780-11.720
Average	0.183	0.0208	0.00489	4.156
Pasture-Range	0.0147-0.0416	0.00611-0.0208	0.000587-0.00161	only one value
Average	0.0269	0.0130	0.000733	2.054
Cultivated-Range	0.00978-0.0758	0.0367-0.0905	0.000440-0.00396	only one value
Average	0.0440	0.0636	0.00257	10.268
Woodland-Range	0.00978-0.0171	0.00587-0.0125	0.0000244-0.00210	0.110-0.323
Average	0.0122	0.00758	0.000244	0.240

* References used were: Burton (1975), Angino (1972), Weibel (1964), Weibel (1966), Weibel (1969), Weidner (1969), Colston (1974), Shannon (1972), Kluesener (1974), EPA (1973), Harriss (1974), Sherwood (1975), and Lamonds (1974).

** Range is the limits of average loadings over a complete discharge hydrograph.

TABLE 2

Urban Land Use Loading Rates*
(lbs/acre/day)

	BOD_5	Total Nitrogen	Total Phosphorus	Suspended Solids
Single Family - Range**	0.0317-0.0487	0.00211-0.0119	0.000584-0.00292	0.424-2.795
Average	0.0446	0.00562	0.00117	0.991
Multiple Family - Range	0.0753-0.116	0.00880-0.0495	0.00191-0.00956	1.005-6.619
Average	0.106	0.0234	0.00383	2.347
Commercial-Range	0.318-0.490	0.0117-0.0660	0.00534-0.0267	4.240-27.915
Average	0.448	0.0312	0.0107	9.899
Industrial-Range	0.125-0.192	0.0186-0.105	0.00343-0.0172	2.526-16.632
Average	0.176	0.0495	0.00689	5.898
Open Space - Range	0.00978-0.0171	0.00587-0.0125	0.0000244-0.00210	0.110-0.323
Average	0.0122	0.00758	0.000244	0.240

* Calculated as explained in text
** Calculated from ranges in table 1

the ratios of the loadings as recommended in STORM and by area weighting with average land uses. The open space loadings were equated to woodland loadings. To understand this conversion, an example is discussed below:

First, the pollutant accumulation rates in STORM were converted to lbs/acre/day. This was done by using STORM's default values and assuming curb lengths per acre for each land use as given in Table 3. Next, these values are multipled together to obtain the desired results as shown in Table 4. For example, commercial nitrogen loading in lbs/acre/day = (3.3/100)*(0.041/100)*83 = 0.001123. The third step is to assume an urban land use distribution. Open space loadings were assumed equivalent to woodland, and the assumed other land uses were 33.75 percent for single family, 33.75 percent for multiple family 27.8 percent for commercial, and 4.7 percent for industrial in Florida. Finally, the one urban accumulation rate in Table 1 was subdivided into the other land uses by the fraction of the land uses contribution to the total urban contributions:

$$\text{Accumulation rate} = \left(\frac{\text{Accumulation rate for land use i}}{\Sigma\ \text{Urban Accumulation}}\right)_{\text{STORM}} * (\text{Accumulation of FTU})$$

where Σ(Urban Accumulation Rate of STORM) = Σ(Accumulation i * Fraction of land use i). For example, suspended solids accumulation rate for single family in STORM is 0.0466 from Table 4, the FTU urban accumulation rate is 4.156 from Table 1 and

$$\Sigma(\text{Urban Accumulation})_{\text{STORM}} = 0.0466*0.3375+0.1104*0.03375$$

$$+ 0.04656*0.2780+0.2774*0.047$$

$$= 0.19547$$

and

$$\text{Accumulation for S.S.} = \left(\frac{0.0466}{0.19547}\right) * 4.156$$

$$= 0.991 \text{ lbs/acre/day}$$

Suspended solids accumulation rates for multiple family, commercial and

TABLE 3

Conversion of STORM loadings into lbs/acre/day

Land Use	Dust and Dirt* Accumulation (lbs/day/100 ft. gutter)	Pounds of Pollutant/100 lbs. of Dust and Dirt				Curb length** (ft/acre)
		SS	BOD	N	PO_4	
Single Family	0.7	11.1	0.50	0.048	0.005	60.0
Multiple Family	2.3	8.0	0.36	0.061	0.005	60.0
Commercial	3.3	17.0	0.77	0.041	0.007	83.0
Industrial	4.6	6.7	0.30	0.043	0.003	90.0
Open or Park	1.5	11.1	0.50	0.048	0.005	30.0

* STORM default values

** Assumed average values

TABLE 4

STORM Pollutant Accumulation Rates*
(lbs/acre/day)

Land Use	SS	BOD	N	PO_4
Single Family	0.0466	0.00210	0.000202	0.000004
Multiple Family	0.1104	0.00497	0.000842	0.000021
Commercial	0.4656	0.02109	0.001123	0.000012
Industrial	0.2774	0.00828	0.001780	0.000005
Open or Park	0.0500	0.00225	0.000216	0.000009

* FOR CALCULATION PURPOSES ONLY, NOT INTENDED AS MODEL INPUTS. Note these BOD, N and PO_4 loadings are dependent on solids loadings.

industrial land uses are 2.347, 9.899, and 5.898 respectively (see Table 2).

The Crops of Engineers has recommended loading rates in the July 1976 STORM users manual, these values are compiled in Table 5.

B. Removal Efficiencies in Surface Runoff

A limited, in-house, literature search was done to investigate pollutant removal efficiencies in detention basins, grass swales, and through soil filtration. This brief search was done in conjunction with the proposed backpumping alternatives considered in the CLAD model to simulate required pollution abatement measures on future developments.

Removal efficiencies applicable to stormwater runoff detention ponds are shown in Table 6. The requirement to retain the first one inch of runoff will allow sufficient time for biological stabilization. A 40% removal efficiency for both nitrogen and phosphorus is selected from the data. From Weibel, et al., nitrogen removals may be even greater.

The efficiencies of grass and grass-soil filters for the water quality treatment of urban runoff was examined by Popkin. The treatment system consisted of a grass-covered filter of native calcarious loam. Both warm and cool season conditions were studied. The following are maximum measured treatment efficiencies in percent, for the grass and grass-soil filters respectively: chemical oxygen demand: 19 and 88; suspended solids; 34 and 99.6; volatile suspended solids; 26 and 97; turbidity: 97 and 98; total coliforms: 84 and 98; fecal coliforms: 50 and 98. Grass maturity and soil compaction improve pollutant removals. Popkin also reviewed literature on grass and soil filtration. Hydraulic loadings or loading capacities and average infiltration rates are established. From this study the author concludes that chlorination of the filtration treated runoff is necessary.

Table 5

Pollutant Accumulation Rates from
July 1976 STORM
(lbs/acre/day)

Land Use	SUS	SET	BOD	NIT*	PO_4	COLI**
Low Density Res. 2-5 DU/AC	.12	.09	.04	.007	.0042	1.200
Med. Density Res. 5-10 DU/AC	.45	.18	.07	.028	.0063	1.260
High Density Res. >10 DU/AC	3.16	1.00	.13	.025	.0200	9.800
Commercial			.46	.212	.0400	9.000
Industrial			.39	.209	.0300	10.000
Open Space and Rural	Average values not available. Consult local water quality specialists.		.02	.007	.0020	1.000
Pastures			3.10	.392	.3500	120.000
Farming			.02	.044	.0002	.500
Forests (Douglas Fir)			.01	.002	.000024	.001

* organic nitrogen + NH_3 + NO_3

** 10^9 MPN/acre/day

Note: These coefficients may not be representative of a given study area and should be adjusted based on site-specific data.

Table 6

Detention Removal Efficiencies (Percent)

	COD	BOD_5	SS	VSS	Tot-N	NH_3	NO_2	NO_3	TKN	Org-N	Tot-P	Sol-P	Reference
Drain Sedimentation		20	60		15						15		Johnson
Sedimentation & Stablization		95	95		40						40		
Detention Storage		20											Burke
Detention time													
1 hr.		20	40							35	10		
2 hrs.		25	60							40	20		
3 hrs.		25	65							40	25		
4 hrs.		30	70							40	30		
5 hrs.		30	70							40	30		
Settling Characteristics													Weibel, et. al.
Settling time													
10 min.	13	40	39	34	9	0	0	0		14	4	0	
20 min.	13	44	46	45	14	0	0	0		21	13	0	
1 hr.	18	20	57	50	28	0	0	0		43	13	0	
4 hrs.	34	20	71	60	56	0	0	0		86	34	0	
24 hrs.	47	48	87	84	56	0	0	0		86	39	0	
Sedimentation													Morris, et. al.
Detention time													
15 min.	16,61	17	37,77						15		7		
20 min.	13-19	13	33-38	24-37									
30 min.	10	12	38						20		13		
1 hr.	18,30	11,20	51,57			0	0	0	20,37	43	13,15		
2 hr.	33												
4 hrs.										40	30		
5 hrs.	33,35	31	50,75	62						43	35		
Design Storm = 2 yr. 1 hr.		35	60		15						35		
Sedimentation													Gill, et.al.
% in Sediment													
Site 1					32					63			
Site 2					23					66			
Site 3					17					31			
Storage Basin		91		28	62					69			Lager & Smith

Myers has done a field study on nutrient (nitrate and phosphate) removal using grass filtration. The parameters studied include: application rate, flow distance, application frequency, and season of the year. Nutrient removals were low ranging from 0-20%. Field and lab tests indicated that contact time was the most important variable. Removal efficiencies increased with increasing flow distance, reduced application rates, and reduced application frequencies. With a soil-grass system, lab tests showed a 90% reduction in nitrate. The authors recommend the incorporation of an impervious layer. Other considerations were: ground cover, temperature, and initial concentrations.

The removal efficiencies that are considered in the CLAD model are related to surface runoff only. The reductions in loadings due to infiltration are accounted for in runoff coefficients for the drainage system. The range of nutrient removal efficiency used in the CLAD model for predicting the future loading from developments with abatement measures is 40-52% assuming 40% reduction in detention basins and 0-20% reductions in grass swales.

C. Runoff Coefficients and Depression Storages for STORM

The runoff coefficients used in STORM for Palm Beach and Broward Counties are as follows: 0.90 for urban impervious areas with direct drainage systems connecting these impervious areas to the drainage canals; 0.40 or 0.45 for urban imprevious with grassed swale drainage, 0.20 for urban pervious areas, and 0.23 for nonurban areas. In STORM, only one urban impervious runoff coefficient can be input. This coefficient is an area weighted average. The urban pervious runoff coefficient is lower than the nonurban coefficient because there is a potential for runoff to drain under impervious areas thus reducing its runoff. In Dade County the assumed runoff coefficients are 0.90 for urban direct drainage impervious, 0.40 for urban grassed swale drainage, and 0.10 for both urban pervious and nonurban.

Depression storages are also necessary for runoff calculations in STORM. The assumed depression storages are: 0.10" for urban, 0.30" for forest, 0.20" for pasture, and 0.30" for cultivated. For high intensity (smooth) cultivated areas a value of 0.10" could be used, however, 0.30" was used because of the flat topography of south Florida. There is only one value of nonurban depression storage used in STORM. These values are also area weighted averages according to land uses.

It is to be noted that all of these values are preliminary estimates, and are subject to revision as more site specific data becomes available.

D. Land Use Aggregation

The mathematical model STORM requires land use pollutant accumulation rates as an input to generate the quality of surface runoff. These land uses are divided into a nonurban classification and five urban groups (1) single family, (2) multiple family, (3) commercial, (4) industrial, and (5) open or park. The nonurban classification is divided external to the program into three land use categories: (1) pasture, (2) cultivated, and (3) woodland. The pollutant accumulation rates for these land uses are area weighted averages for the one nonurban land use classification.

The "Land Use Coding System" (South Florida Water Management District) is divided into three levels: I, II, and III, each with increasing land use clarification. The interface of this system with the STORM model is given in Table 7. The basin model inputs and outputs are listed in figure 7.

4. APPLICATIONS

4.1 Western West Palm Beach Canal (C-51) Plus L-8

Water quantity and quality predictions are made for the West Palm Beach Canal basin with backpumping. This backpumping alternative includes both

TABLE 7

Aggregation of SFWMD's Land Use Coding System into STORM Land Uses

Level I	Level II	Level III	STORM	
Urban & Built Up Land	Residential	Single Family Low density Medium density Mobile home	Single Family	
		Sing.Fam-High density Multiple Family	Multiple Family	
	Commercial & Services Open & Other	* Golf Course	Commercial	
	Industrial Institutional Transportation	* * *	Industrial	
	Open & Other (less golf course and underdevelopment)	*	Open Space	
Wetlands Barren Land Forest Land Rangeland Water	* * * * *	* *	Woodland**	
Agriculture	Cropland Orchards etc. Confined Feeding Operations	* *	Cultivated**	Non-Urban
	Pasture	*	Pasture**	

* Expanded Classification Omitted, for further breakdown the reader is referred to the South Florida Water Management District's Land Use Coding System.

** Subgroup, area weighted for nonurban land use

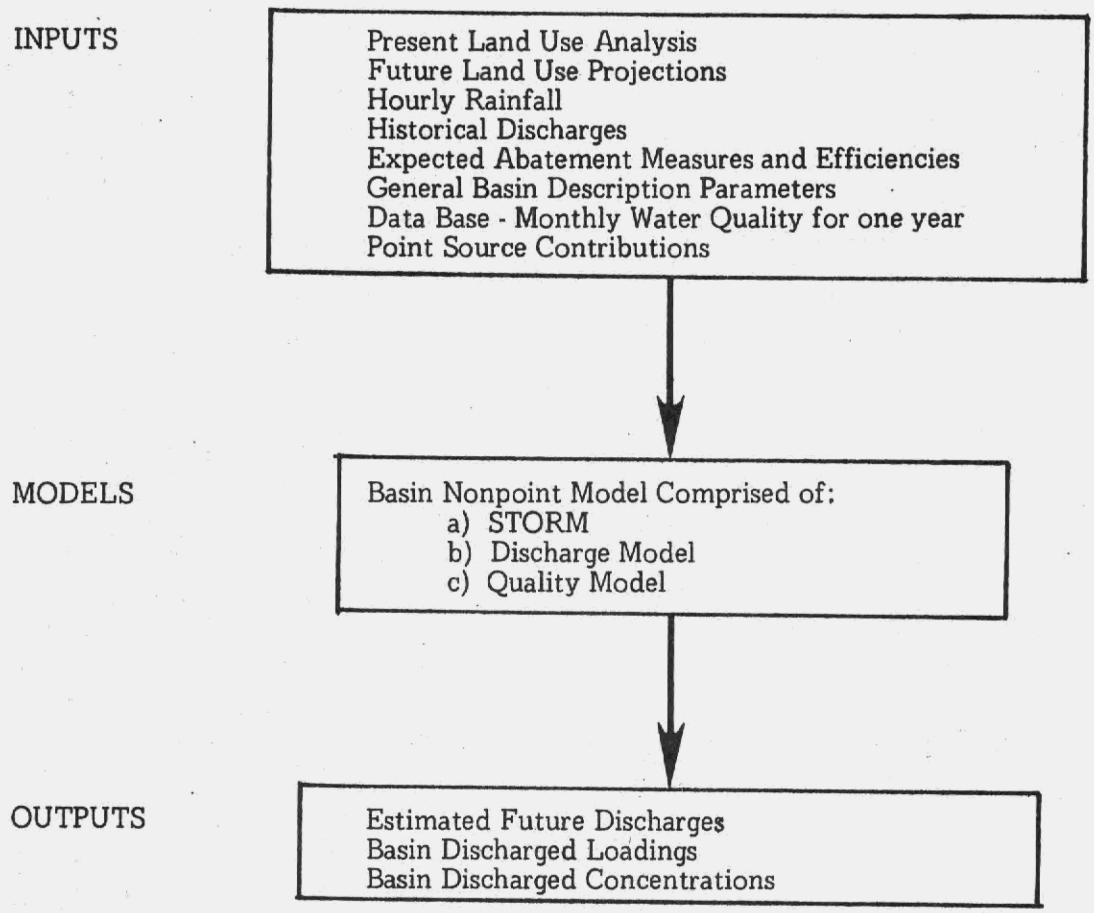


FIGURE 7

THE MODEL INPUTS AND OUTPUTS

the west C-51 and L-8 basins. The west C-51 analysis makes use of the CLAD model. The requirement to subtract M-Canal demands from L-8 discharges necessitated a separate analysis for this basin. The results for both basins, for two land uses (1973-74 and plan scenario), are included. Model inputs and assumptions are discussed below:

4.1.1 Discussion

This discussion is divided into three sections:
1) The west C-51 basin analysis, 2) the L-8 basin analysis and 3) the total backpumped basin.

(1) West C-51 basin

In conjunction with the backpumping studies, the west C-51 basin (Figure 1) discharges and nutrient water quality are estimated for two-land uses: 1973-74 and plan scenario. The basin discharge CLAD model is used.

Land uses have been aggregated or expanded for use in the model as shown in Table 8. Future land use projections did not subdivide agricultural usage into pasture and cultivated. This was done after consultation with the Land Resources's staff, by assuming only 60% of the present pasture lands would remain pastures, the remainder is assumed to be cultivated. In Table 8, the obvious omissions of future multiple family, commercial, and industrial land uses are a result of the land use projection source: (i.e., in the Palm Beach County Master Land Use Plan, the scale was too large to include such land uses). Table 8 also gives the area weighted impervious percentages used in the model.

Pollutant accumulation rates (lbs/acre/day) and depression storages (interception plus surface ponding) are correlated to land uses. Depression storages, as in the WPCF Manual of Practice No. 9, are assumed to be 0.1" for urban areas and for nonurban areas: 0.3" for forest, 0.2" for pasture, 0.1" for high intensity (smooth) cultivated, and 0.3" for low intensity cultivated. The area weighted nonurban depression storages were calculated to be 0.294" and 0.162"

Table 8. West C-51 Land Uses

	1973-4 LAND COVER		PLAN SCENARIO	
	Area (Acres)	Percent Imperviousness (Area Weighted)	Area (Acres)	Percent Imperviousness (Area Weighted)
URBAN				
Single Family	3747	21.4	51707	20.0
Multiple Family	28	80.0		
Commercial	239	85.0		
Industrial	22	61.1		
Open Or Park	14338	5.0	811	5.0
Total Urban	18373		52518	
NONURBAN				
Cultivated	12676		13017	
Pasture	7833		4700	
Woodland	35968		4616	
Total Nonurban	56477		22333	
Total Basin	74851		74851	

for 1973-74 and plan scenario land uses, respectively. The pollutant accumulation rates used for the west C-51 basin are listed in Table 9. The nonurban loading rates have also been area weighted. In the calibration run, if these loading rates did not fit, then they would have been adjusted accordingly. However, no such adjustment is necessary to the west C-51 basin.

As mentioned earlier, the January 1975 version of the Corps of Engineers mathematical model called STORM is incorporated into the CLAD model. In this version of STORM, BOD, N, and P urban washoffs are a function of urban solids loadings. These urban solids loadings were omitted because they would have led to erroneous BOD, N, and P washoffs. However, if zero loadings are input then default values are included in calculations. To avoid this situation very small values, such as 0.000001 for solids dust and dirt accumulation rates are added. Nonurban area loadings don't have this solids dependence, and therefore, are used as model inputs.

This version of STORM was set up for curb and gutter drainage. That is, the pollutant accumulation rates are as a function of the footage of gutters per acre. However, loading rates can be forced into lbs/acre/day by simply inputting pseudo curb lengths and pounds of dust and dirt accumulation rates. For example, in STORM, the inputs are:

$$\left(X\,\frac{\text{ft. gutters}}{\text{acre}}\right) * \left(Y\,\frac{\text{lbs.dust and dirt}}{\text{100 ft. gutter/day}}\right) * \left(\frac{\text{lbs. of pollutant}}{\text{100 lbs of dust and dirt}}\right)$$

$$= XY\frac{\text{lbs. of a pollutant}}{\text{10,000 acre/day}}$$

Therefore, by using any combination of X*Y = 10,000, the pollutant accumulation rates in lbs/acre/day can be directly converted to "lbs. of a pollutant/ 100lns. of dust and dirt". Note, because of the low loading rates and limited input fields, the program was set up to use ten times the lbs/acre/day loadings by inputting X*Y value of only 1000. The July 1976 version of STORM has the option to use lbs/acre/day accumulation rates; however, it wasn't available at

Table 9. Pollutant Accumulation Rates (lbs/acre/day) for the West C-51 basin.

	BOD_5	Total Nitrogen	Total Phosphorus	Suspended Solids
URBAN				
Single Family	0.0446	0.00562	0.00117	0.0
Multiple Family	0.106	0.0234	0.00383	0.0
Commercial	0.488	0.0312	0.0107	0.0
Industrial	0.176	0.0495	0.00689	0.0
Open Or Park	0.0122	0.00758	0.000244	0.0
NONURBAN				
Pasture	0.0269	0.0130	0.000733	2.054
Cultivated	0.0440	0.0636	0.00257	10.268
Woodland	0.0122	0.00758	0.000244	0.240
NONURBAN AREA WEIGHTED				
1973-74 Land Uses	0.0213	0.0206	0.000825	2.705
Plan Scenario	0.0338	0.0414	0.001703	6.467

the time the CLAD Mode was written.

The exponents used for dust and dirt washoffs are 15.0 and 0.46 for urban and nonurban land uses respectively. These are arrived at by calibrating STORM's output for total nitrogen and total phosphorus. The following combinations of urban and nonurban exponents were tried: 15,4.6; 15,0.46; 15,0.05; 4.6,0.46; 4.6,0.05, and 0.46,0.46.

STORM uses a modified rational method to calculate surface runoff:

Surface Runoff = C * (Rain - Available Depression Storage)

The calculation interval is hourly. For this basin, hourly rainfall at the Loxahatchee recording stations, Florida climatological data was used. In cases where data was missing, West Palm Beach airport precipitation was substituted. This data has been stored on tape at FSU in Tallahassee (location RI1098, number 7782, File 1), and is also available on cards.

The runoff coefficients used in this analysis are: 0.2 for urban pervious areas, 0.9 for urban impervious areas, 0.23 for nonurban areas, and 0.45 for urban impervious areas with grassed swale drainage. For the 1973-74 and plan scenario land uses, the area weighted runoff coefficients are calculated as 0.239 and 0.255 respectively. The urban pervious coefficient of 0.2 is lower than the nonurban coefficient because these areas are thought to drain under the impervious areas, thus reducing their runoff. Many variables are considered in selection of these runoff coefficients, including the low ground slopes, soil transmissivities, indirect routing of rooftop drainage over lawns to storm drainage, secondary drainage under impervious areas, and grassed swale drainage.

Three separate approaches were taken to estimate the maximum urban runoff coefficient for the 1973-74 land uses. First, as shown in Table 10, using WPCF's Manual of Practice No. 9 as a reference the runoff coefficient is calculated as 0.291. This coefficient is applicable for storms of 5-10 year frequency. If less frequent and more intense storms are under consideration,

Table 10. "C" of Q=CIA West C-51 1973-4 Land Uses

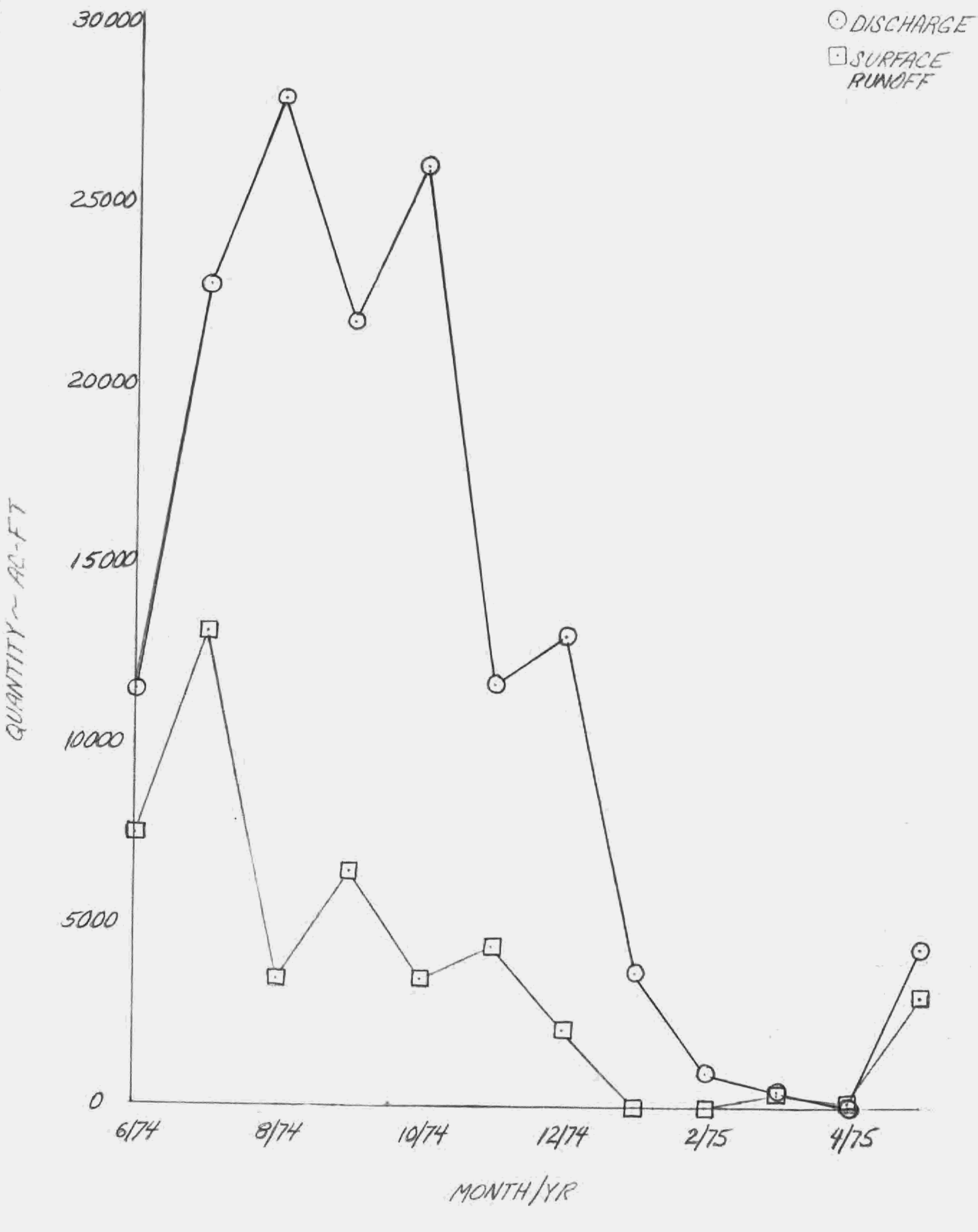
LAND USE (SFWMD)	EQUIVALENT (WPCF)	AREA (Acres)	RUNOFF COEFFICIENT (Average)	C*AREA
Residential				
Low density	Residential Suburban	3591.29	0.375	1405
Med. density	" "	155.33	"	
Multiple family	Multi Detached	28.01	0.50	14
Commercial	Neighborhood Business	239.37	0.60	162
Institutional Gov.	" "	9.36	"	
Industrial	Light Industrial	6.35	0.65	8
Water Supply Plant	" "	5.94	"	
Open & Other				
Golf Course	Park	154.73	0.175	3708
Under Development	Avg. Res. Sub. and Unimproved	14126.72	0.2625	
Open & Undeveloped	Unimproved	56.14	0.20	15
		18373.23		5339
Runoff Coefficient (Area Weighted)				0.291

higher coefficients should be used. Five and ten year storms of 24 hours duration in southeastern Florida are about 3.8 and 9 inches of rainfall, respectively. These are obviously not average events. The 0.291 runoff coefficient should therefore be too high for most rainfall events. This coefficient is used in calculations of peak runoff with the formula Q = CIA. By using the runoff calculation as in STORM, this runoff is reduced by the initial abstractions to depression storage. Secondly, an attempt to use the SCS curve number technique was made. For the hydrologic soil groups of this basin, Cn = 55, and a 10 year, 24 hour storm the equivalent runoff coefficient is 0.388. Finally, runoff hydrographs were graphed by SFWMD's hydrology staff. This resulted in runoff coefficients of about 40%. These calculations are all for major events, and therefore serve only to set a limit on the runoff coefficient as input in STORM.

These runoff coefficients could be studied and defined with more accuracy in the future. However, because these coefficients are applied to such a large basin (74851 acres), when considering the data accuracy (rainfall, discharges, etc.), improvements in defining one variable without improving all variables would probably be unjustified. Also since the CLAD model is based on discharges, and surface runoff is only a portion of that amount, these coefficients become less critical to the overall analysis. The resultant proportionment of surface runoff to discharges for the data base period is illustrated in Figure 8.

When estimating future runoff coefficients for urban areas, ninety percent of future developments were assumed to have grassed swales (GS), the remaining ten percent are assumed to have curb and gutter (CG) drainage. The overall urban impervious runoff coefficient is calculated by area weighting. For the west C-51 basin the newly developed urban area (NDUA) is:

FIGURE 8
WEST C-51 BASIN QUANTITIES FOR THE
DATA BASE PERIOD



NDUA = Total future urban area (TFUA)

- open future urban area

- [total present urban area (TPUA) - open present urban area]

= 47672 acres

and the urban impervious coefficient is:

$$\text{CIMP} = \frac{\text{NDUA}}{\text{TFUA}} * (\text{Fraction GS} * \text{CIMP of GS}$$

$$+ (1\text{-fraction GS}) * \text{CIMP of CG})$$

$$+ ((\text{TFUA} - \text{TPUA})/\text{TFUA}) * \text{CIMP of present drainage system}$$

$$= 0.532$$

This analysis assumed that for future nonurban land uses, no abatement measures would be required. Two probable abatement measures have been included as nutrient sinks for future urban developments: (1) grassed swales; 90% of the newly developed urban areas are expected to have this type of drainage, and (2) detention basins; it was assumed that 50% of the newly developed urban areas will be required to have these. The nutrient removal efficiencies used in this analysis are from a limited literature search. These efficiencies are 10% and 40% for both total nitrogen and phosphorus, for grassed swales and detention basins, respectively. These removals for the entire future urban area are calculated to be:

REFF = EFFGS*FRACGS+(1-EFFGS*FRACGS)*EFFDB*FRACDB*NDUA/TFUA

= 0.247 or 24.7%

where

REFF = Removal efficiency for future urban areas

EFFGS = Removal efficiency for grassed swales

FRACGS = Fraction of area in newly developed urban areas to have grassed swales

EFFDB = Removal efficiency of detention basins

FRACDB = Fraction of area in newly developed urban areas to have detention basins

NDUA = Newly developed urban area

TFUA = Total future urban area

This calculation assumes that all areas required to have detention basins will also be required to have grassed swale drainage. It further assumes, for areas with both abatement measures, that after grassed swales remove 10% of the nutrients, 40% of the remaining nutrients (40% of 90%, or 36%) can still be removed in the detention basins. There is obviously a limit to these removals from abatement measures applied in series. A great deal of research in these areas is necessary to establish abatement removal efficiencies.

The uptakes from abatement measures are difficult to define where groundwater components are involved. A total mass balance is necessary to define the system correctly. For example, consider nutrient inflows to a detention basin of 100 lbs via surface runoff at 1.0 mg/l, and 100 lbs. via groundwater flow at 0.5 mg/l. For these, the outflows are 20 lbs. at 0.5 mg/l via overflow, and 50 lbs. at 0.5 mg/l via groundwater. Removal efficiencies of this system could be calculated as: 65% (200 lbs. in, 70 lbs. out), or 80% (100 lbs. in, 20 lbs. out via surface waters). The first calculation is probably the best, while data collection would be much easier for the surface water calculations. There are many unanswered questions in the above, such as: where and how would groundwater measurements be made? What is the sediments role in uptakes and releases? What roles do soils and soil sorption play? and what are the long term removals? In short, abatement removal efficiencies are ill defined and need a lot of future research. This backpumping alternative calls for raising the west C-51 stage from 8.5 to 14.0 ft. The effects of this were investigated by the Groundwater Division of the South Florida Water Management District. Their conclusion was that it should have minimal effects on the water budget. Potential evaporation data was taken from an unpublished manuscript by the RPD of the SFWMD, "Drought Analysis for the Florida Lower East Coast", see Table 11. In STORM, these are used to evaporate water from depression storage during hours of no rainfall. These values are also used to calculate surface water evapotranspirations. For present land uses, they are simply multiplied by the measured surface water area. For future conditions, the surface water is increased by assuming 10% of the lands required to have detention basins (50% of the newly developed urban areas) would be used for water control.

Historical discharges (1963-75) from the west C-51 basin are calculated from available USGS surface water data. This is done by assuming 65% of the C-51 basin generated discharges are from the west subbasin. This 65% is based on the basins area ratio (west C-51/C-51 area = 64.4%) and three hydrologic calculations completed by the hydrology staff which resulted in percentages around 65%. Flows are calculated because flow measurements at the east boundary of the west C-51 basin are not available. The west C-51 generated discharges are calculated from:

$$Q = 0.65\ (WPB - S5AE)$$

where,

WPB = flow discharged at the West Palm Beach locks

S5AE = flow discharged at Structure 5A East

Discharges were calculated on a daily basis and are available from January 1961 through June 1975. These discharges are not allowed to be negative, (i.e., if S5AE discharges exceeded WPB discharges, the flow generated in the C-51 basin is assumed to be zero). Additional basin inflows from S5AE probably introduce some discharge calculation errors. For example, this inflow keeps the groundwater artificially high in the dry season. At the beginning of the wet season, higher discharges probably occur because of this.

Table 11. Potential Evaporation Rates

MONTH	POTENTIAL EVAPORATION (in/month)	(in/day)
January	3.23	0.104
February	1.36	0.048
March	2.41	0.078
April	5.08	0.169
May	5.64	0.182
June	6.39	0.213
July	6.71	0.216
August	6.79	0.219
September	6.01	0.200
October	4.83	0.156
November	3.88	0.129
December	2.54	0.082
Yearly	54.87	

Future discharge calculations are made from historical discharges, surface runoff calculations, depression storage evapotranspirations, and surface water evapotranspiratinns and are correlated to the increase in impervious cover. This increased fraction of imperviousness is calculated using the following equation:

$$\begin{aligned} IFI &= \text{increased fraction impervious} \\ &= \Sigma(IF * Area_i/\text{Total Area})\ \text{Future} \\ &\quad - \Sigma(IF_i * Area_i/\text{Total Area})\ \text{Historical} \\ &= 0.116 \text{ or } 11.6\% \end{aligned}$$

where

IF_i = Impervious fraction for land use i

The quality calculations are based on one year of bimonthly data taken at four locations in the west C-51 basin from 6/74 to 5/75, see Table 12. These sampling sites are located, going from west to east: just east of S5AE, at McArthur Bridge, at Old Wellington Road, and at State Road 7. Monthly nutrient values are obtained by simply averaging all four collection stations. Questions have been raised about what concentrations should be used to represent monthly discharge concentrations. First, simple data calculations for total nitrogen can be different; e.g., if any NO's or TKN's are missing from a sample, one might argue that none of the other values in this sample should be used in the monthly averages. In the approach chosen, all measured values are used. Some other logistical problems also arise from assuming this simple average is representative of discharged monthly concentrations. Alternative approaches are available that address these problems, such as: area weighted average of the measured data, and using the values at SR7 or S5AE. Elaborate statistical and logistical calculations could be made, but because of the measurement frequency and data accuracy, these calculations are not justified.

Table 12. West C-51 Surface Water Quality Data

Date	TKN (mg/l)	No. TKN Samples	NO_3-N (mg/l)	No. NO_3 Samples	NO_2-N (mg/l)	No. NO_2 Samples	Total N $=TKN+NO_x$ (mg/l)	Total P (mg/l)	No. TP Samples
June 74'	3.48	8	0.799	8	0.067	8	4.35	0.065	8
July	1.68	8	0.229	8	0.023	8	1.93	0.131	8
August	1.54	8	0.185	9	0.052	9	1.78	0.077	9
September	1.27	4	0.087	8	0.014	8	1.37	0.068	8
October	1.44	12	0.194	12	0.021	12	1.66	0.113	12
November	0.87	8	0.124	8	0.004	8	1.00	0.133	8
December	1.45	4	1.112	4	0.030	4	2.59	0.108	4
January 75'	0.72	8	0.103	7	0.011	8	0.83	0.176	8
February	1.19	4	0.353	4	0.011	4	1.55	0.049	4
March	1.36	8	0.583	7	0.056	8	2.00	0.113	8
April	1.01	8	0.254	8	0.007	8	1.27	0.050	8
May	1.48	14	0.307	14	0.046	12	1.83	0.050	13

Quality calculations are made with a mass balance approach. Yearly discharged nutrients from the CLAD model are equated to the calculated loadings from the data base. Table 13 and Figures 9 and 10 present the resultant model output with the quality data for the calibration period (6/74-5/75). The total discharged pollutants are equated to the sum of those in surface runoff plus those from other nonpoint sources and sinks. These other nonpoint concentrations are set to match yearly and monthly loadings.

Any point sources must be allowed for external to the program. Future point source contributions are assumed to be zero.

At present there is very little knowledge concerning these other nonpoint sources. Two attempts have been made to gain some knowledge concerning these sources. First, a literature search for groundwater nutrient data was done.

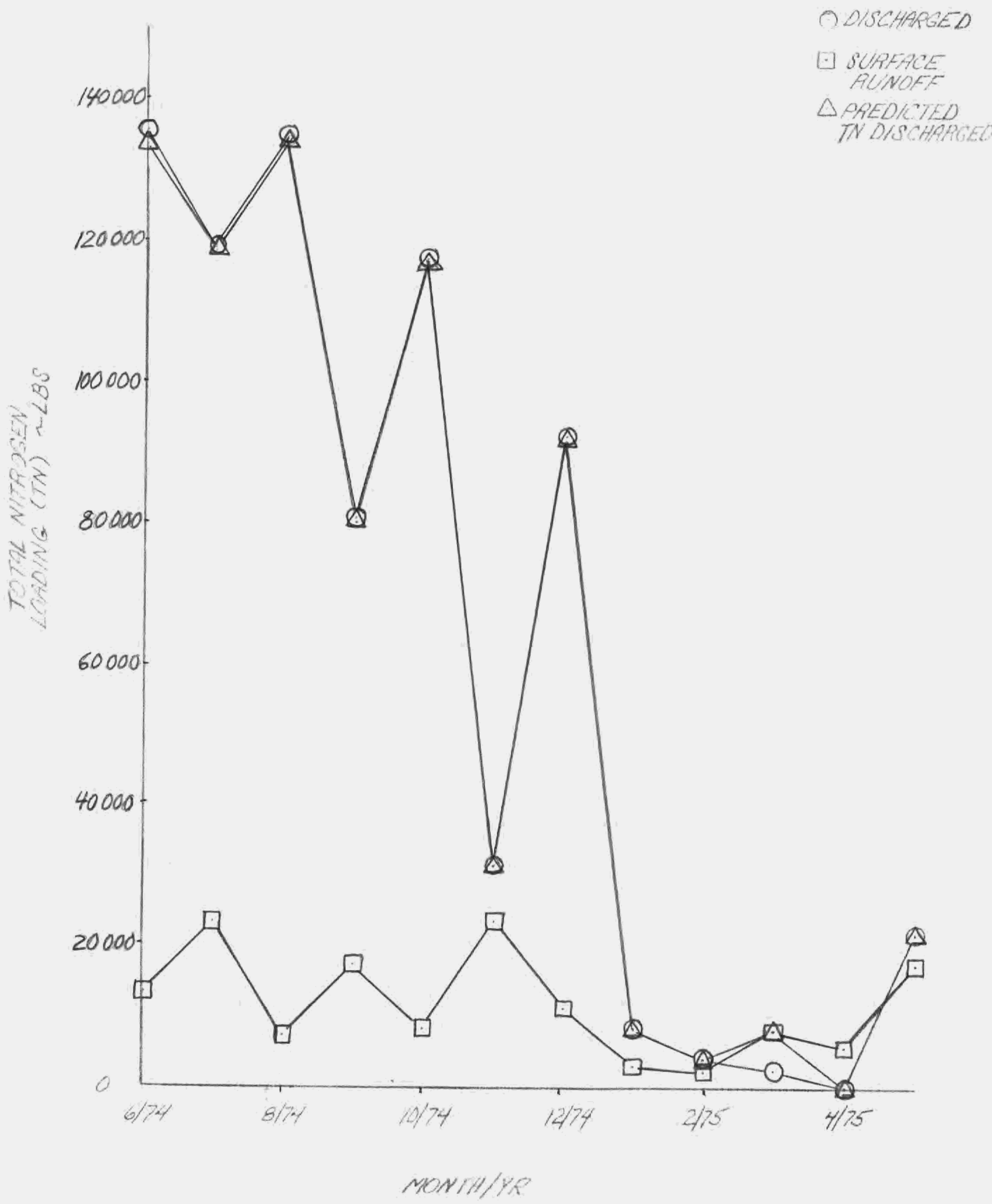
Unfortunately, all nutrient data in this basin, except for one NO_3 -N measurement = 0.34 mg/l at 23 ft. depth, is below 50 ft. Nutrient concentrations to depths of 200 ft. are reviewed for reference. The average total nitrogen -N and total phosphorus -P groundwater concentrations from this literature search are 1.22 and 0.08 mg/l respectively. The second investigative measure was taken to drill three shallow wells adjacent to C-51, collect samples and measure their nutrient concentrations. To date only one set of samples has been collected. The average total nitrogen and total phosphorus concentrations are 1.96 mg/l and 0.068 mg/l. For comparison the average other nonpoint sources and sinks concentrations for the data base period used in this analysis are 2.26 mg/l and 0.117 mg/l for total nitrogen -N and total phosphorus -P, respectively. A concentration summary for the data base period is given in Table 14.

The nutrients in rainfall that fall directly on surface water are also considered. Because of the relatively small areas of surface waters, these contributions are found to be negligible.

Table 13. West C-51 Quantities and Quality Data Base Period

DATE	DISCHARGE	DATA BASE				MODELED			
		Total Nitrogen		Total Phosphorus		Total Nitrogen		Total Phosphorus	
	(Ac-Ft)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)
June 74'	11466	135555	4.35	2026	0.065	138413	4.44	2187	0.070
July	22746	119310	1.93	8098	0.131	123120	1.99	7924	0.128
August	27868	134815	1.78	5832	0.077	134474	1.78	5741	0.076
September	21697	80786	1.37	4010	0.068	81016	1.37	3959	0.067
October	26051	117529	1.66	8000	0.113	117207	1.66	7822	0.110
November	11677	31735	1.00	4221	0.133	32100	1.01	4157	0.131
December	13127	92401	2.59	3853	0.108	91811	2.57	3766	0.106
January 75'	3695	8335	0.83	1767	0.176	8288	0.83	1722	0.172
February	956	4027	1.55	127	0.049	4002	1.54	268	0.103
March	450	2446	2.00	138	0.113	8179	6.69	579	0.474
April	0	0	1.27	0	0.050	0	-	0	-
May	4407	21918	1.83	599	0.050	22020	1.84	1024	0.085
Total Avg.	144140	748857	(1.91)	38671	(0.099)	760630	(1.94)	39149	(0.100)

FIGURE 9
WEST C-51 BASIN
TOTAL NITROGEN LOADINGS FOR THE
DATA BASE PERIOD



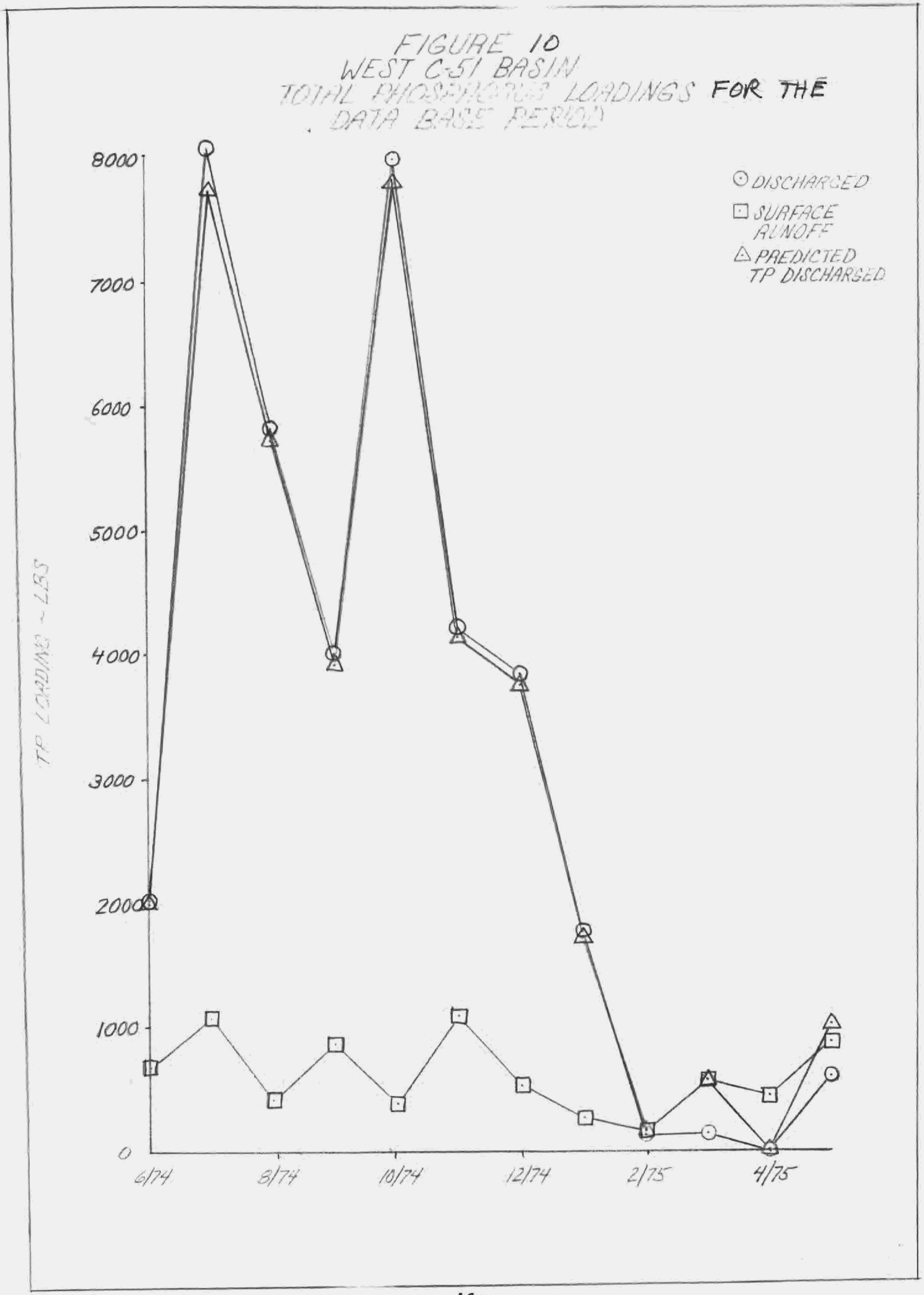


FIGURE 10
WEST C-51 BASIN
TOTAL PHOSPHORUS LOADINGS FOR THE
DATA BASE PERIOD
DISCHARGED
SURFACE RUNOFF
PREDICTED TP DISCHARGED
TP LOADINGS ~ LBS
8000
7000
6000
5000
4000
3000
2000
1000
0
6/74
8/74
10/74
12/74
2/75
4/75

Table 14. West C-51 Nutrient Concentrations Data Base Period Yearly Averages

	Total Nitrogen (mg/l)	Total Phosphorus (mg/l)
Discharged	1.91	0.099
Modeled Discharge	1.94	0.100
Modeled ONPS*	2.26	0.117
STORM	1.27	0.066
Shallow Groundwater		
Literature Search	1.22	0.080
Collected Data	1.96	0.068

* Other nonpoint sources and sinks

These calculations for the west C-51 future basin discharges include no increased demands. These increases will be considered elsewhere in the back-pumping evaluations.

All west C-51 model inputs and their results are given in Exhibits 7.1 and 7.2 for the 1973-74 and Exhibits 7.3 and 7.4 for plan scenario land uses.

(2) L-8 Basin

The L-8 Basin analysis assumed that there would be no land use changes within this basin. The results from this analysis are, therefore, used in both the 1973-74 and plan scenario land uses. Quantities available for backpumping are calculated from available USGS surface water data, and from M-Canal demands for the City of West Palm Beach. M-Canal demands are calculated from pumping hours as recorded in "West Palm Beach Water Department Source of Supply Reports" from 1/65 to 5/75. These demands are calculated by assuming a pumping rate of 12 Ac-Ft/hr/pump. By adding L-8 discharges (USGS data) and the calculated M-Canal demands, the total L-8 generated discharges are obtained. However, these discharges are not representative of what can be expected to be available for future backpumping. L-8 discharges must consider M-Canal demands. This was done by assuming any increased demands would be satisfied by Lake Okeechobee. Therefore, M-Canal demands from L-8 were not increased over present demands.

Several attempts were made to define M-Canal demands, including correlations to: the month of year, L-8 discharges, and the following rainfalls; accumulative, for the same month, for the present and preceding months, for the present and two preceding months, for the preceding month, and for the two preceding months. From the above, there were no clear cut correlations, however, it was found that maximum demands could be related to rainfall. The approach finally chosen to calculate quantities of water available from L-8 for backpumping was: for the rainfall record of 1969-74, use L-8 generated flows less the demands from that period; for the 1963-8 rainfall record, use L-8 generated flows less M-Canal demands as correlated to the rainfall of the two preceding months, see Figure 5. The 1969-74 period had some negative L-8 flows. These were taken to be zero since they obviously weren't generated on the basin. During months of both positive and negative flows only the positive flows were used.

The M-Canal demands in Figure 11 are shown to be 11400 Ac-Ft/month for no rainfall, and linearly reducing to 6,600 Ac-Ft/month for 22 inches of rainfall for the two preceding months. Above this 22 inches, it is assumed that M-Canal demands would be zero. When these demands exceed L-8 basin discharges, the available backpumped quantities are set equal to zero. As previously stated, this simply means these additional demands will be supplied from Lake Okeechobee. This approach may give low available discharges but it is conservative in estimating backpumped quantities. For no reason should these discharges be used for a flood protection analysis. When making flood protection calculations, the safest and most realistic assumption to make is that the M-Canal demands would be zero. These quantity calculations are shown in Exhibit 7.5.

Quality calculations for the L-8 basin were made from data available at the time of computations (12/76). These data and the monthly cocentrations used in loading calculations are listed in Table 16. For months when two data points are available, their average is used. When no data is available, the average of all the other data is substituted. The nutrient loadings, as shown in Table 15, are calculated from these concentrations and the aforementioned quantities.

(3) Total West Palm Beach Backpumped Basin

One area being analyzed for possible backpumping is the west C-51 plus the L-8 basins. This is titled the West Palm Beach Canal Backpumping Alternative. The quantities and quality of water from the total basin are simply

FIGURE 11

HISTORICAL M-CANAL DEMANDS FROM L-8

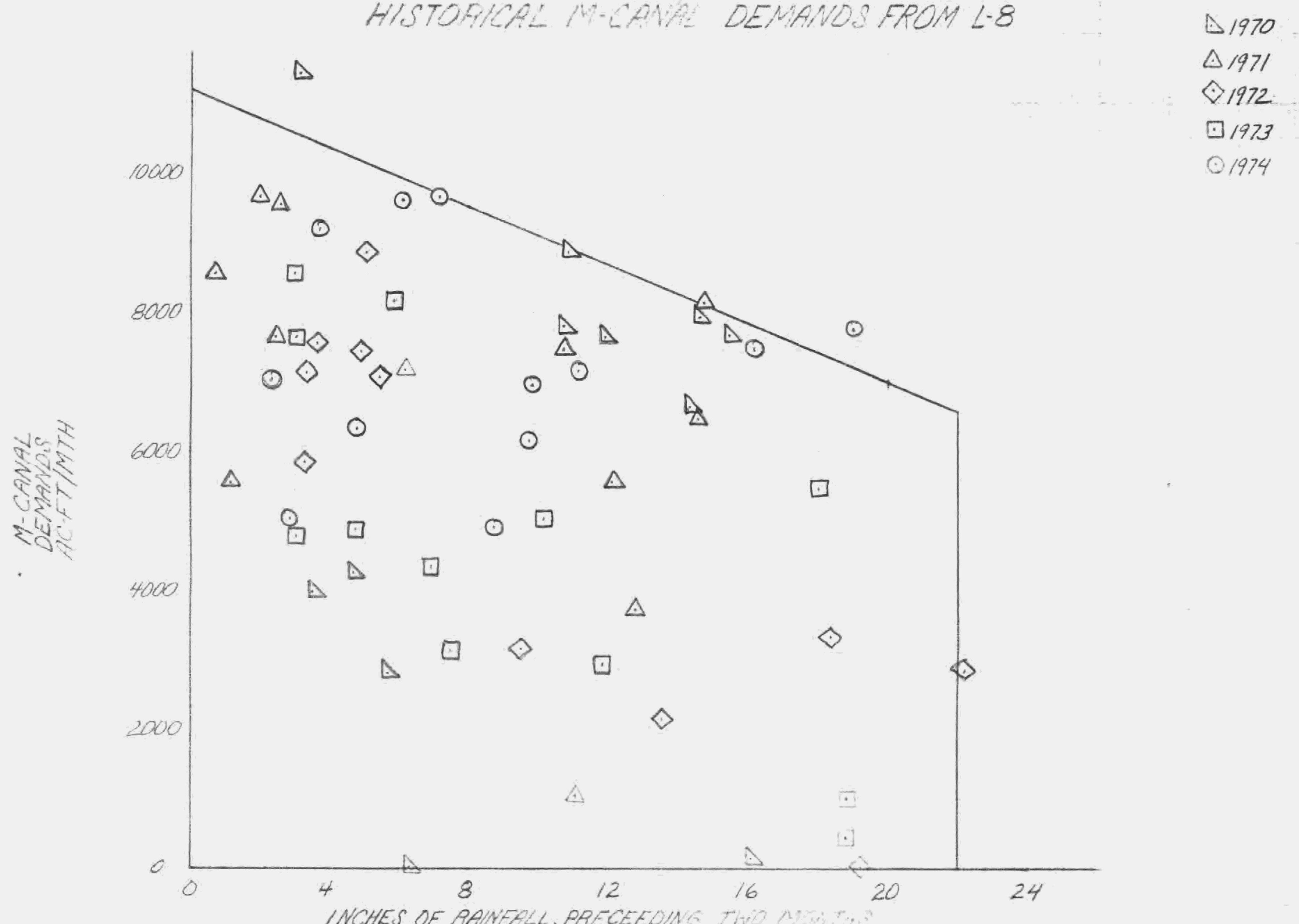


Table 15. L-8 Basin Available Backpumped Quantities and Nutrient Loadings

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/63	None	9388	Same	10800	0	0	0
2		10050	as	10900	0	0	0
3		12309	L-8	10400	1909	7938	280
4		11423	Discharges,	10100	1323	5501	194
5		8918		10600	0	0	0
6		12383		9700	2683	12104	438
7		7414		8700	0	0	0
8		7075		9600	0	0	0
9		6514		9400	0	0	0
10		9400		8200	1200	4631	114
11		2291		8900	0	0	0
12/63		3205		10400	0	0	0
1/64	None	17821		9400	8421	35016	1236
2		12783		9200	3583	14899	526
3		7646		10050	0	0	0
4		5867		9600	0	0	0
5		6549		9200	0	0	0
6		9150		9500	0	0	0
7		8707		9400	0	0	0
8		17950		8050	9900	45740	2556
9		19940		8500	11440	44150	1306
10		23700		8500	15200	58660	1446
11		22620		8400	14220	59130	2248
12/64		21836		8600	13236	55038	1943
1/65	36	17574	17610	10200	7410	30812	1087
2	48	12165	12213	10700	1513	6291	222
3	1872	13619	15491	10400	5091	21169	747
4	1770	5821	7591	10200	0	0	0
5	5424	4820	10244	10400	0	0	0
6	8472	8590	17062	10500	6562	29605	1070*
7	5118	9802	14920	8100	6826	26900	557
8	2292	11782	14074	0	14074	65025	3634
9	1938	10802	12720	8200	4520	17440	516
10	0	30382	30382	9100	21283	82136	2025
11	12	27582	27594	7100	20482	85168	3006
12	1926	15656	17582	8200	9382	39012	1377

Table 15. (Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/66	12	19918	19930	10700	9230	38380	1355
2	0	22417	Same	9500	12917	53711	1896
3	0	21031	as	8850	12181	50651	1788
4	0	7613	L-8	9900	2287	9510	336
5	0	10435	Discharges	9700	735	3056	108
6	0	37773		8650	29123	131389	4749
7	0	41427		7000	34627	136457	2823*
8	0	40717		6900	33817	156242	8731
9	0	42982		7500	35402	136625	4041
10	0	26628		6900	9928	38315	944
11	1920	5355	7275	8450	0	0	0
12	0	8795	8795	10300	0	0	0
1/67	1446	8563	10009	10700	0	0	0
2	7776	4903	12679	10100	1979	8229	290
3	6696	6936	13632	10200	3432	14271	504
4	7824	2737	10561	10200	361	1501	53
5	9528	7888	17416	11000	6416	26679	942
6	6966	7367	14333	11200	3133	14135	511
7	1956	13317	15273	8600	6473	25312	523
8	0	12502	12502	0	12502	57762	2088
9	24	7503	7527	8100	0	0	0
10	12	12823	12835	8900	3935	15186	374
11	426	2870	3296	8500	0	0	0
12/67	6606	4735	11341	9900	1441	5992	211
1/68	3834	5820	9654	10600	0	0	0
2	7752	6881	14633	10400	4233	17602	621
3	5520	3423	8943	10400	0	0	0
4	9186	7139	16325	9800	6525	27132	958
5	6840	6450	13290	10300	2990	12433	439
6	0	51447	51447	9100	42583	191049	6905
7	42	48541	48583	0	48583	191455	3961
8	846	14067	14913	0	14913	68901	3850
9	792	10754	11546	8200	3346	12913	382
10	156	33537	33693	9100	24593	94910	2807
11	990	11948	12938	9100	3838	15959	563
12/68	1986	4473	6459	9700	0	0	0*

Table 15. (Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/69	5448	2085	Calculation not necessary	Same as Historical Demands	Same as Histor. Discharges	8670	306
2	7194	4514				18770	662
3	3906	20930				87031	3072
4	5412	4993				20783	734
5	1530	5334				22180	783
6	6882	16431				74129	2679
7	4842	6373				25115	520
8	456	10600				48974	2737
9	1740	10223				39453	1167
10	36	41810				161355	3977
11	36	27106				112712	3978
12/69	36	19228				79954	2822
1/70	2808	14509				60331	2129
2	3978	16467				68473	2417
3	4236	43916				182611	6445
4	282	38541				160261	5656
5	6624	17484				72702	2566
6	0	30914				139469	5041
7	7920	20763				81822	1693
8	7692	25866				119507	6678
9	8886	31595				121933	3606
10	7632	16792				64804	1917
11	7806	607				2524	89
12	11418	1704				7086	250
1/71	8556	1042				4331	153
2	7656	10				42	2
3	9552	5963				24799	875
4	5526	3362				13980	493
5	9654	318				1322	47
6	7194	250				1128	41
7	3720	887				3499	72
8	8124	137				633	35
9	1044	12264				47329	1440
10	7488	819				3261	80
11	5550	4130				17171	606
12/71	6468	845				3514	124

Table 15. (Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/72		54	Calculation	Same	Same	225	8
2	7428	238	not	as	as	990	35
3	5894	224	necessary	Histor.	Histor.	931	33
4	7074	932		Demands	L-8	3875	137
5	2160	5617			Discharge	23357	824
6	0	9551				43089	1557
7	2880	6839				26951	558
8	3326	1113				5142	287
9	3168	958				3697	109
10	8772	280				1079	32
11	7554	2				8	0
12/72	7116	58				241	9
1/73	7656	44				181	6
2	4350	0				0	0
3	3114	0				0	0
4	4890	0				0	0
5	8556	0				0	0
6	4794	236				1065	38
7	5034	9578				37745	1425
8	5472	7113				32864	1836
9	1008	7712				29761	880
10	468	5455				21050	519
11	2940	0				0	0
12/73	8160	224				931	33
1/74	6318	1004				4173	147
2	4908	363				1509	53
3	9258	91				379	13
4	7020	0				0	0
5	5088	0				0	0
6	9192	1527				6889	249
7	6972	11903				46907	970
8	7758	10790				49852	2786
9	7494	2123				8191	242
10	7152	5381				20767	512
11	6156	1337				5560	196
12/74	9624	26				108	4

Table 16 L-8 Quality Measured and Averaged Values

Date or Month	Coding	Total Nitrogen-N (mg/l)	Total Phosphorus-P (mg/l)
6/17/76	BCE-122	1.66	0.060
7/15/76	BCE-259	1.53	0.031
7/29/76	BCE-329	1.38	0.029
8/13/76	BCE-409	1.77	0.047
8/26/76	BCE-484	1.63	0.143
9/9/76	BCE-531	1.42	0.050
9/21/76	BCE-595	1.42	0.034
10/6/76	BCE-664	-	0.035
January		1.53	0.054
February		1.53	0.054
March		1.53	0.054
April		1.53	0.054
May		1.53	0.054
June		1.66	0.060
July		1.45	0.030
August		1.70	0.095
September		1.42	0.042
October		1.42	0.035
November		1.53	0.054
December		1.53	0.054

the sum of the two subbasins. Results for the 1973-74 and plan scenario land uses are presented in Exhibits 7.3 and 7.4, respectively. These predictions represent the maximum quantities available for backpumping, with their corresponding loadings and concentrations. The dates are indicative only of a rainfall record, and are not indicative of historical conditions. These exhibits include the results of the west C-51 basin as calibrated in February 1977 plus the previous (12/76) L-8 calculations. These estimates can be updated with additional L-8 quality data.

4.1.2 SUMMARY

1) Available discharges for backpumping and the loadings and concentrations for the West Palm Beach canal backpumping alternative (West C-51 plus L-8) are predicted for 1973-74 and plan scenario land uses.

2) Historical discharges are calculated from available USGS surface water data. Future discharges are estimated from these discharges for the same rainfall record with changes in land uses.

3) All quality predictions are based on the data base period when the quality data were collected (from 6/74 to 5/75 for the West C-51 basin, and from 6/76 to 10/76 for the L-8 basin).

4) The CLAD model is used to predict plan scenario water quantities and qualities and 1973-74 land use water quality from the west C-51 basin for the rainfall/discharge record of 1/63 to 12/74.

5) Increased future demands from the west C-51 basin are not included in these predictions. They must be considered in subsequent analyses.

6) The L-8 basin analysis assumed there would be no land use changes in this basin. These quantity and quality predictions are done by calculating

L-8 generated discharges, subtracting present M-Canal demands, and using available quality data to calculate loadings and concentrations.

7) Any additional M-Canal demands on the L-8 basin are assumed to be supplied by Lake Okeechobee. Present M-Canal demands, as defined herein, are taken from historical discharges to find the quantities of water availble for backpumping from this basin.

8) Maximum M-Canal demands are correlated to the sum of the two preceding months of rainfall. No direct correlations to demands are found. The resultant predicted L-8 discharges available for backpumping are, therefore, minimums. This provides a conservative estimate.

9) Under no circumstances should these flows be used in flood protection analyses. This is because of the conservative L-8 discharge calculations, as above, and more importantly because of the monthly time step.

10) These predictions are done with a fairly consistent level of accuracy. To get better predictions a much more detailed analysis to a greatly expanded data base would be necessary.

11) Shallow groundwater quality in the west C-51 basin was investigated. The results are included.

12) The water quality and quantity effects of grassed swales and detention basins are included in this analysis.

13) There is much uncertainty concerning nonpoint sources of pollution.

14) All model inputs, assumptions, and supporting investigations made on this basin are incorporated in this report.

4.2 Western Tamiami Canal (C-4) Basin with Snapper Creek

4.2.1 Discussion

In conjunction with the backpumping studies, the west Tamiami basin discharges and nutrient water quality are estimated for two land uses: 1973-74 and pattern scenario. The basin discharge CLAD model is used. Figure 6 shows the west C-4 basin boundaries.

Land uses have been aggregated or expanded for use in the model as shown in Table 17. Future land use projections had one nonurban land use: agriculture and open space. This is divided into three land uses: cultivated, open and water. Both cultivated and water are assumed to be the same area as in the 1973-74 land uses, the remainder is assumed open space.

Pollutant accumulation rates (lbs/acre/day) and depression storages (interception plus surface ponding) are correlated to land uses. Depression stoarges, as in the WPCF manual of Practice No. 9, are assumed to be 0.1" for urban areas and for nonurban areas; 0.3" for forest; 0.2" for pasture; 0.1" for high intensity (smooth) cultivated; and 0.3" for low intensity cultivated. The area weighted nonurban depression storages are calculated to be 0.24" and 0.30" for 1973-74 and pattern scenario land uses, respectively. The pollutant accumulation rates used in this analysis are listed in Table 18. The nonurban loading rates are area weighted averages. All total phosphorus loading rates have been reduced by approximately a factor of 10. The surface runoff calibration of phosphorus showed excessive amounts of phosphorus relative to what was being discharged. This is probably a result of the high soil transmissivities which allows the phosphorus to chemically react with and get absorbed into the soils.

The exponents for dust and dirt washoffs used are 4.6 and 0.46 for urban and nonurban land uses, respectively. These are arrived at by calibrating

Table 17. West Tamiami Land Uses

	1973-4 LAND COVER		PATTERN SCENARIO	
	Area (Acres)	Percent Imperviousness (Area Weighted)	Area (Acres)	Percent Imperviousness (Area Weighted)
URBAN				
Single Family	7717	34.0	18335	35.0
Multiple Family	854	79.6	1022	65.0
Commercial	142	85.0	690	85.0
Industrial	1391	79.6	3457	61.0
Open or park	3739	5.0	1366	5.0
Total Urban	13843		24870	
NONURBAN				
Cultivated	2354		4930	
Pasture	11488		0	
Woodland	12366		10251	
Total Nonurban	26208		15181	
Total Basin	40051		40051	

Table 18. Pollutant Accumulation Rates (lbs/acre/day) for the Tamiami Basin.

	BOD_5	Total Nitrogen	Total Phosphorus	Suspended Solids
URBAN				
Single Family	0.0446	0.00562	0.000125	0.0
Multiple Family	0.106	0.0234	0.000409	0.0
Commercial	0.488	0.0312	0.001137	0.0
Industrial	0.176	0.0495	0.000735	0.0
Open or Park	0.0122	0.00758	0.000026	0.0
NONURBAN				
Pasture	0.0269	0.0130	0.000078	2.054
Cultivated	0.0440	0.0636	0.000274	10.268
Woodland	0.0122	0.00758	0.000026	0.240
NONURBAN AREA WEIGHTED				
1973-74 Land Use	0.0244	0.0168	0.0000774	1.993
Pattern Scenario	0.0218	0.0254	0.0001052	3.483

STORM's output to the trends and limits in the data base for Total Nitrogen and Total Phosphorus. The following combinations of urban and nonurban exponents were tried: 15,4.6; 15,0.46; 15,0.05; 4.6,4.6; 4.6,0.46; 4.16,0.05; 0.46,4.6; 0.46,0.46; 0.46,0.05.

The rainfall data used in this basin's analysis is that of Miami airport. This hourly precipitation data is stored on tape at FSU in Tallahassee (location RI1098, number 7782, file 3), or is available on cards.

The runoff data used in this basin's analysis are 0.10 for urban pervious areas, 0.9 for urban impervious areas, 0.10 for nonurban areas, and 0.40 for urban impervious areas with grassed swale drainage. For the 1973-74 and pattern scenario land uses, the area weighted runoff coefficients are calculated to be 0.181 and 0.245 respectively. The low runoff coefficients are a result of the highly pervious soils. Figure 12 illustrates the resultant proportionment of surface runoff to discharges for the data base period.

When estimating the future urban areas runoff coefficients, ninety percent of future developments are assumed to have grassed swales, the remaining ten percent to have curb and gutter drainage. The area to be developed, calculated from the differences in the pattern scenario and 1973-74 land uses, is 13,400 acres. The resultant impervious runoff coefficient calculated by area weighting is 0.658.

This analysis assumed no abatement measures would be required of nonurban land uses. Two probable abatement measures have been included as nutrient sinks for future urban developments: grassed swales and detention basins. It is assumed that 50% of the newly developed urban areas will be required to have detention basins and 90% will have grassed swales. Removal efficiencies were calculated as before to be 14.7% for Total Nitrogen and Total Phosphorus.

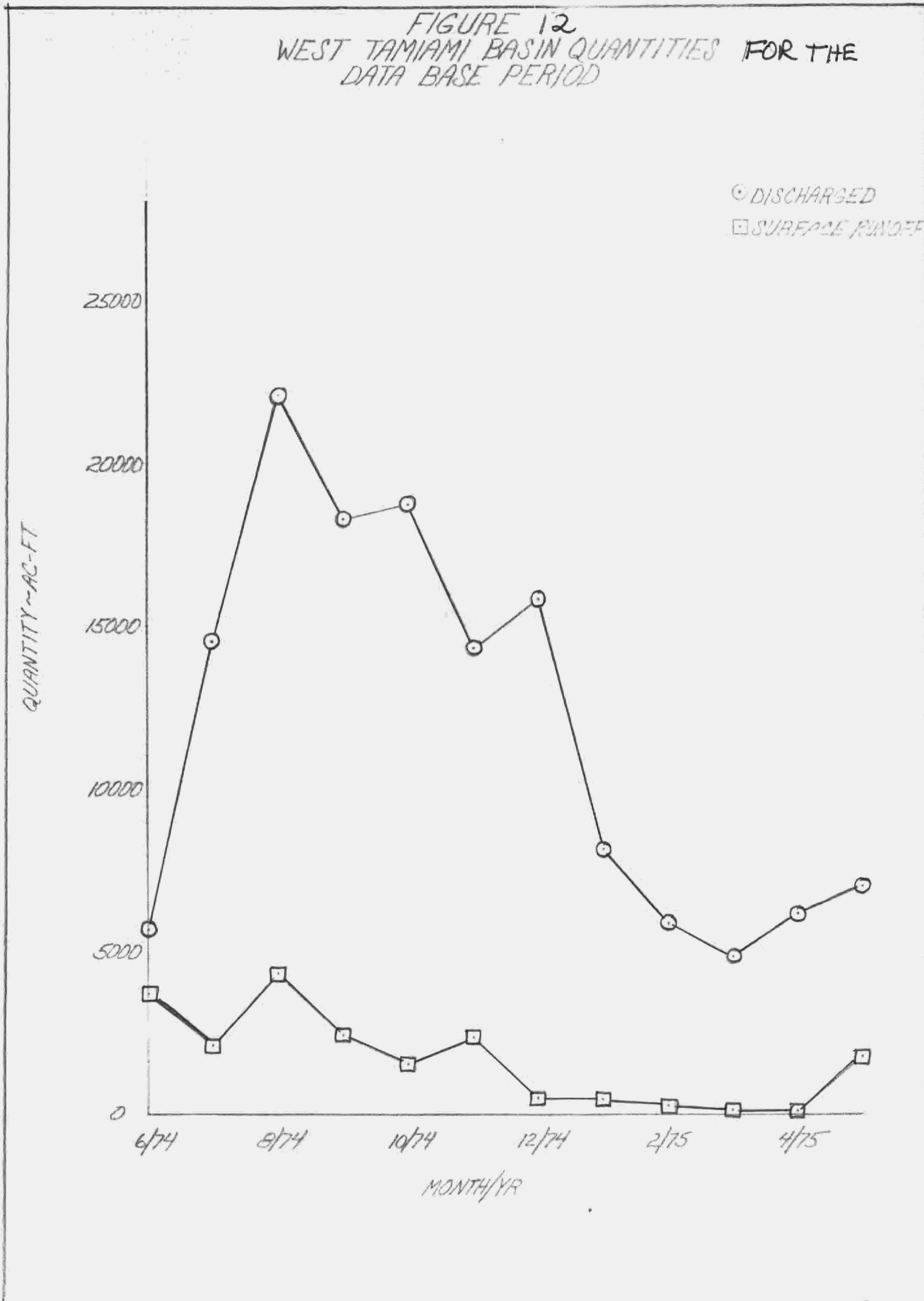


FIGURE 12
WEST TAMIAMI BASIN QUANTITIES FOR THE
DATA BASE PERIOD
DISCHARGED
SURFACE RUNOFF
QUANTITY~AC-FT
25000
20000
15000
10000
5000
0
6/74
8/74
10/74
12/74
2/75
4/75
MONTH/YR

Potential evaporation rates are used to calculate future surface water evaporations by assuming detention basins would use 10% of the development's land areas (See Table 11).

Historical discharges (1963-75) from the west Tamiami basin are calculated from available USGS surface water data. This is done simply by adding the discharges as recorded in the Tamiami Canal near Coral Gables (02289500) plus that in the Snapper Creek Canal at Miller Drive (02290610).

Future discharge calculations are made from historical discharges, surface runoff calculations, depression storage evapotranspirations, surface water evapotranspirations and are correlated to the increase in impervious cover. This increased fraction imperviousness is calculated to be 0.145 or 14.5 percent.

Quality calculations are based on one year of bimonthly data from 6/74 to 5/75, see Table 19. Monthly nutrient values are obtained by simply averaging all collection stations. Alternative approaches are possible, but as before, this simple average should suffice.

The quality calculations are made with a mass balance approach. Yearly discharged nutrients from the CLAD model are equated to the calculated loadings from the data base. Table 20 and Figures 13 and 14 present the resultant model outputs with the quality data for the calibration period (6/75-5/75). The total discharged pollutants are equated to the sum of those in surface runoff plus those from other nonpoint sources and sinks. These other nonpoint concentrations are set to match yearly and monthly loadings. These concentrations aren't well understood, they are therefore assumed constant in this analysis.

Any point sources must be included external to the program. Future point source contributions are assumed to be zero.

These future discharge calculations don't include increased demands. These increases are considered elsewhere in the backpumping evaluations.

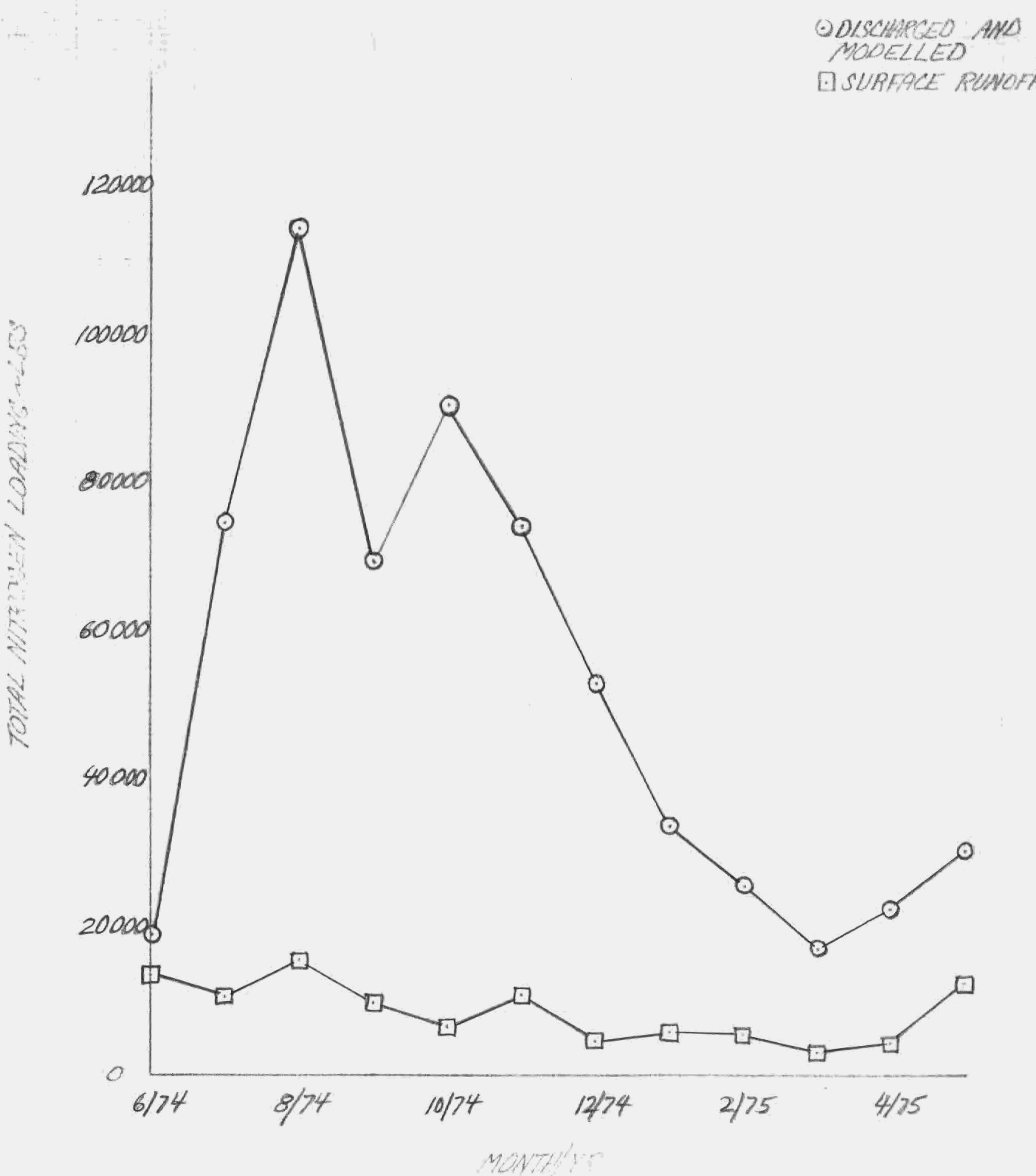
Table 19. West Tamiami Basin Surface Water Quality Data

Date	TKN (mg/l)	No. TKN Samples	NO_3-N (mg/l)	No. NO_3 Samples	NO_2-N (mg/l)	No. NO_2 Samles	Total N =TKN+NO_x (mg/l)	Total P (mg/l)	No. TP Samples
June 74'	1.11	6	0.091	6	0.008	6	1.21	0.019	6
July	1.84	3	0.039	3	0.010	3	1.89	0.013	3
August	1.79	2	0.097	4	0.011	4	1.90	0.010	4
September	1.29	4	0.080	7	0.020	7	1.39	0.014	7
October	1.62	9	0.141	9	0.011	9	1.77	0.021	9
November	1.39	6	0.499	6	0.013	6	1.90	0.010	6
December	1.10	3	0.121	3	0.007	3	1.23	0.002	3
January 75'	1.31	6	0.194	6	0.020	6	1.52	0.019	6
February	1.19	3	0.371	3	0.032	3	1.59	0.085	3
March	1.08	5	0.183	5	0.020	5	1.28	0.081	5
April	1.27	9	0.065	9	0.006	9	1.34	0.011	9
May	1.50	6	0.073	6	0.009	6	1.58	0.015	6

Table 20. West Tamiami Basin Quantities and Quality Data Base Period

DATE	DISCHARGE	DATA BASE				MODELED			
		Total Nitrogen		Total Phosphorus		Total Nitrogen		Total Phosphorus	
	(Ac-Ft)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)	Loading (lbs)	Conc. (mg/l)
June 74'	5740	18876	1.21	296	0.019	18843	1.21	298	0.019
July	14464	74296	1.89	511	0.013	74255	1.89	510	0.013
August	22120	114223	1.90	782	0.010	114200	1.90	796	0.013
September	18332	69253	1.39	698	0.014	69005	1.39	702	0.014
October	18766	90273	1.77	1071	0.021	89998	1.76	1053	0.021
November	14339	74043	1.90	390	0.010	74096	1.90	380	0.010
December	15840	52951	1.23	86	0.002	52907	1.23	100	0.002
January 75'	8150	33668	1.52	421	0.019	33666	1.52	419	0.019
February	5890	25452	1.59	1361	0.085	25376	1.59	1365	0.085
March	4920	17115	1.28	1083	0.081	17107	1.28	1079	0.081
April	6217	22641	1.34	186	0.011	22621	1.34	184	0.011
May	7060	30316	1.58	288	0.015	30204	1.57	282	0.015
Total (Avg)	141838	623107	(1.62)	7173	(0.019)	622278	(1.61)	7168	(0.019)

FIGURE 13
WEST TAMIAMI BASIN
TOTAL NITROGEN LOADINGS FOR THE
DATA BASE PERIOD



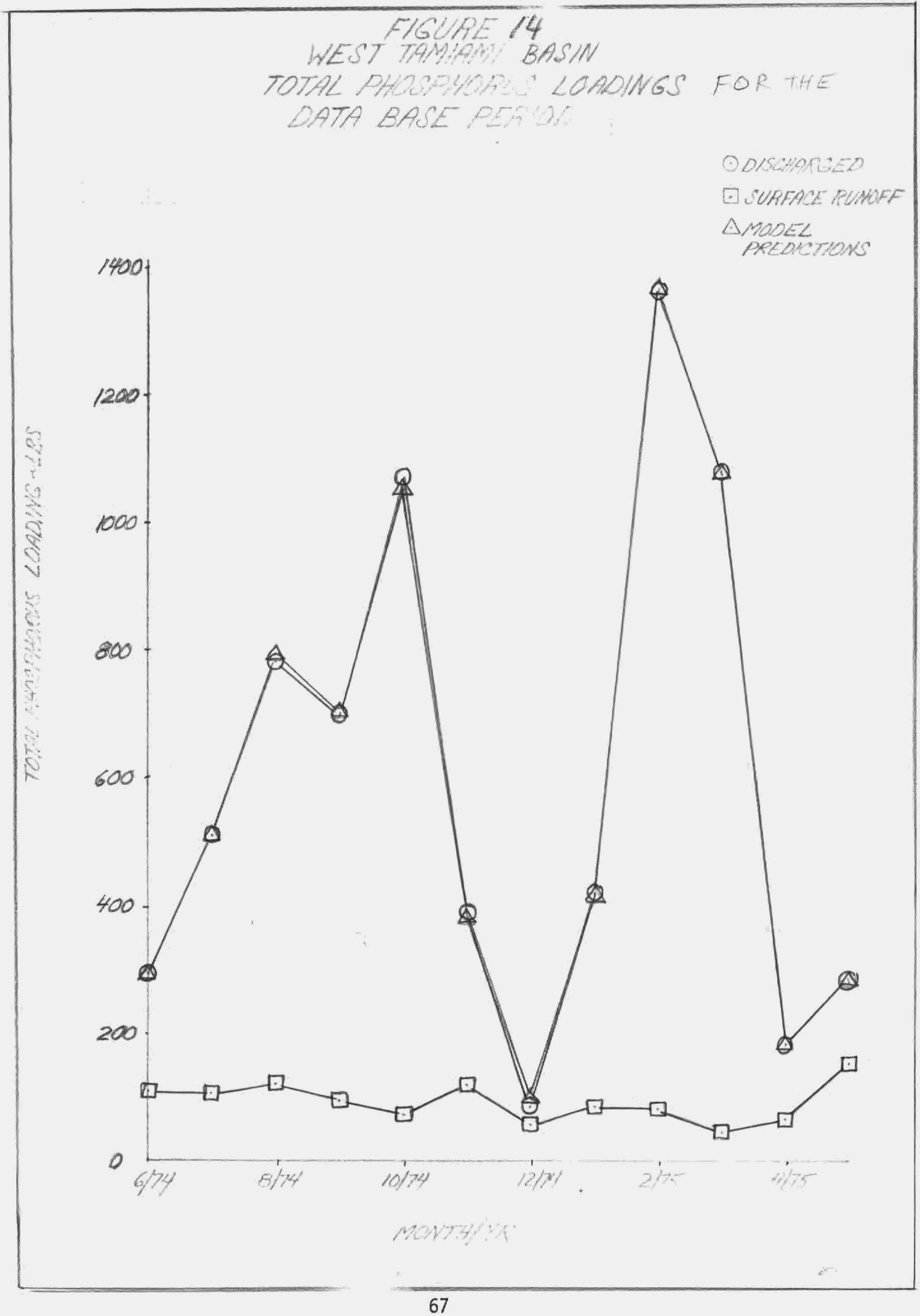


FIGURE 14
WEST TAMIAMI BASIN
TOTAL PHOSPHORUS LOADINGS FOR THE
DATA BASE PERIOD
DISCHARGED
SURFACE RUNOFF
MODEL PREDICTIONS
1400
1200
1000
800
600
400
200
0
6/74
8/74
10/74
12/74
2/75
4/75
MONTH/YR
TOTAL PHOSPHORUS LOADING ~ LBS

All west Tamiami model inputs and their results are given in Exhibits 7.6, 7.7, 7.8 and 7.9 for the 1973-74 and plan scenario land uses.

4.2.2 Summpar for C-4 Basin

1) Estimates of the available discharges, their loadings and concentrations for the west Tamiami backpumping alternative for 1973-74 and pattern scenario are made with the use of the CLAD model.

2) All quality predictions are based on the data base. Quality data were collected from 6/74 to 5/75 for the west C-4 basin.

3) The CLAD model is used to predict pattern scenario water quantities and nutrient quality, and 1973-74 land use nutrient quality from the west Tamiami basin for the rainfall/discharge record of 1/63 to 12/74.

4.3 Hillsboro Canal (C-14) Basin

4.3.1 Discussion

In conjunction with the backpumping studies, the west Hillsboro plus C-14 basin discharges and nutrient water quality are estimated for two land uses: 1973-74 and plan scenario (see Figure 10). The basin discharge CLAD model is used.

The land uses have been aggregated for use in the model as shown in Table 21.

Pollutant accumulation rates (lbs/acre/day) and depression storages (interception plus surface ponding) are correlated to land uses. Depression storages, as in the WPCF manual of Practice No. 9, are assumed to be 0.1" for high intensity (smooth) cultivated, and 0.3" for low intensity cultivated. The area weighted nonurban depression storages were calculated to be 0.23" and 0.30" for 1973-74 and plan scenario land uses, respectively. The pollutant accumulation rates used in this analysis are listed in Table 22. These loading rates are half of those as in Table 2. The surface runoff calibration gave a better correlation

Table 21. Hillsboro + C-14

	1973-74 LAND COVER		PLAN SCENARIO	
	Area (Acres)	Percent Imperviousness (Area Weighted)	Area (Acres)	Percent Imperviousness (Area Weighted)
URBAN				
Single Family	5727	39.2	64543	22.7
Multiple Family	546	70.8	2544	65.0
Commercial	289	87.1	1513	84.6
Industrial	2620	10.8	3065	65.6
Open or park	19540	5.0	3253	19.6
Total Urban	28722		74918	
NONURBAN				
Cultivated	17390		1740	
Pasture	14329			
Woodland	19718		3501	
Total Nonurban	51437		5241	
Total Basin	80159		80159	

Table 22. Pollutant Accumulation Rates (lbs/acre/day)
Hillsboro plus C-14 Basin

	BOD_5	Total Nitrogen	Total Phosphorus	Suspended Solids
URBAN				
Single Family	0.0223	0.00281	0.000585	0.0
Multiple Family	0.0530	0.0117	0.001915	0.0
Commercial	0.244	0.0156	0.00535	0.0
Industrial	0.0880	0.02475	0.003445	0.0
Open or Park	0.0061	0.00379	0.000122	0.0
NONURBAN				
Pasture	0.01345	0.00650	0.0003665	1.027
Cultivated	0.0220	0.0318	0.001285	5.134
Woodland	0.0061	0.00379	0.000122	0.120
NONURBAN AREA WEIGHTED				
1973-74 Land Uses	0.0135	0.01401	0.000583	4.136
Plan Scenario	0.0114	0.01309	0.000508	3.569

to the discharged loadings with these reduced loading rates. These pollutant accumulation rates were input to STORM in lbs/acre/day as previously explained.

The exponents for dust and dirt washoffs used are 4.6 and 0.46 for urban and nonurban land uses, respectively. These are arrived at by calibrating STORM's output to the trends and limits in the data base for Total Nitrogen and Total Phosphorus. The following combinations of urban and nonurban exponents were tried: 14,4.6; 15,0.46; 15,0.05; 4.6,4.6; 4.6,0.46; 4.6,0.05; 0.46,4.6; 0.46,0.46; 0.46,0.05.

The rainfall data used in this basin analysis is that of the Boca Raton station. This hourly precipitation data is stored on tape at FSU in Tallahassee (location RI1098, number 7782, file 4), or is available on cards.

The runoff coefficients used in this analysis are: 0.20 for urban pervious areas, 0.90 for urban impervious areas, 0.23 for nonurban areas, and 0.40 for urban impervious areas with grassed swale drainage. For the 1973-74 and plan scenario land uses, the area weighted runoff coefficients are calculated to be 0.255 and 0.284, respectively. Figure 15 illustrates the resultant proportionment of surface runoff to discharges for the data base period.

When estimating the future urban areas runoff coefficients, ninety percent of future developments are assumed to have grassed swales, the remaining ten percent to have curb and gutter drainage. The area to be developed, calculated from the differences in the plan scenario and 1973-74 land uses, is 62483 acres. The resultant impervious runoff coefficient is 0.525.

This analysis assumed no abatement measure would be required for nonurban land uses. Two probable abatement measures are included as nutrient sinks for future urban developments: grassed swales and detention basins. It is assumed that 50% of the newly developed urban areas will be required to have detention basins and 90% will have grassed swales. Removal efficiencies are calculated to be 22.7% for Total Nitrogen and Total Phoshorus.

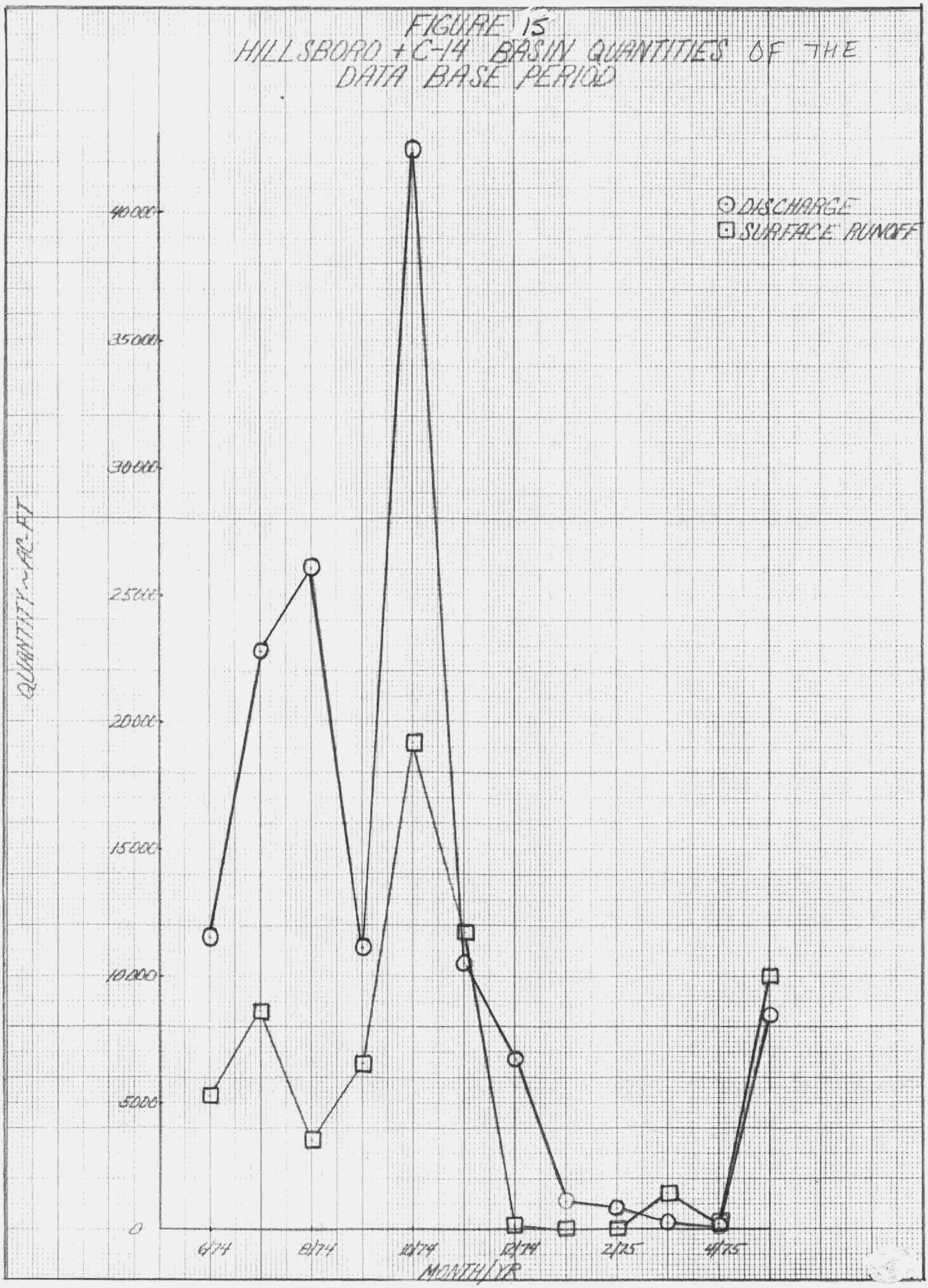


FIGURE 15
HILLSBORO + C-14 BASIN QUANTITIES OF THE DATA BASE PERIOD
DISCHARGE
SURFACE RUNOFF
QUANTITY ~ AC-FT
40000
35000
30000
25000
20000
15000
10000
5000
0
6/74
8/74
10/74
12/74
2/75
4/75
MONTH/YR

Potential evaporation rates of Table 11 are used to calculate future surface water evaporations by assuming detention basins would use 10% of the new developments land area.

Historical discharges are calculated by the Water Resources Division using the positive differences in flow between the Deerfield Locks (02281500, Hillsboro Canal near Deerfield Beach) and S39 (Hillsboro near Deerfield) plus the positive differences in flow between S37A (02282100, Cypress Creek Canal) and S-38 (Conservation Area 2). This is done on a daily basis.

Future discharge calculations are made from historical discharges, surface runoff calculations, depression storage evapotranspiration, and surface water evapotranspiration and are correlted to the increase in impervious cover. This increased fraction imperviousness is calculated as 0.144 or 14.4 percent.

Quality calculations are based on one year of bimonthly data from 6/74 to 5/75, see Table 23. Monthly nutrient values are obtained by simply averaging the 3 collection stations.

The quality calculations are made with a mass balance approach. Yearly discharged nutrients from the CLAD model are equated to the calculated loadings from the data base. Table 24 and Figures 16 and 17 present the resultant model outputs with the quality data for the calibration period (6/75 - 5/75). Total discharged pollutants are equated to the sum of those in surface runoff plus those from other nonpoint sources and sinks. These other nonpoint concentrations are set to match yearly and monthly loadings.

All Hillsboro plus C-14 model inputs and their results are given in Exhibits 7.10, 7.11, 7.12 and 7.13 for the 1973-74 and plan scenario land uses.

4.3.2 Summary

1) Estimates of the available discharges, and their loadings and concentrations for the Hillsboro plus C-14 backpumping alternative for 1973-74 and plan scenario land uses are made with the use of the CLAD model.

Table 23. Hillsboro + C-14 Surface Water Quality Data

Date	TKN (mg/l)	No. TKN Samples	NO_3-N (mg/l)	No. NO_3 Samples	NO_2-N (mg/l)	No. NO_2 Samples	Total N = TKN+NO_x (mg/l)	Total P (mg/l)	No. TP Samples
June 74'	1.29	6	0.046	6	0.010	6	1.35	0.035	6
July	2.19	3	0.052	3	0.010	3	2.25	0.069	3
August	2.08	6	0.048	6	0.009	6	2.14	0.250	6
September	1.36	3	0.032	6	0.006	6	1.40	0.124	6
October	1.40	9	0.048	9	0.011	9	1.46	0.251	9
November	0.92	6	0.138	5	0.011	6	1.07	0.109	6
December	1.06	3	0.270	3	0.019	3	1.35	0.186	3
January 75'	1.24	6	0.057	6	0.015	6	1.31	0.056	6
February	1.26	3	0.017	3	0.019	3	1.30	0.042	3
March	1.13	6	0.039	5	0.010	6	1.18	0.042	6
April	1.39	6	0.012	6	0.005	6	1.41	0.028	6
May	1.80	9	0.045	9	0.009	9	1.85	0.048	9

FIGURE 16
HILLSBORO + C-14 TOTAL NITROGEN LOADINGS OF THE
DATA BASE PERIOD

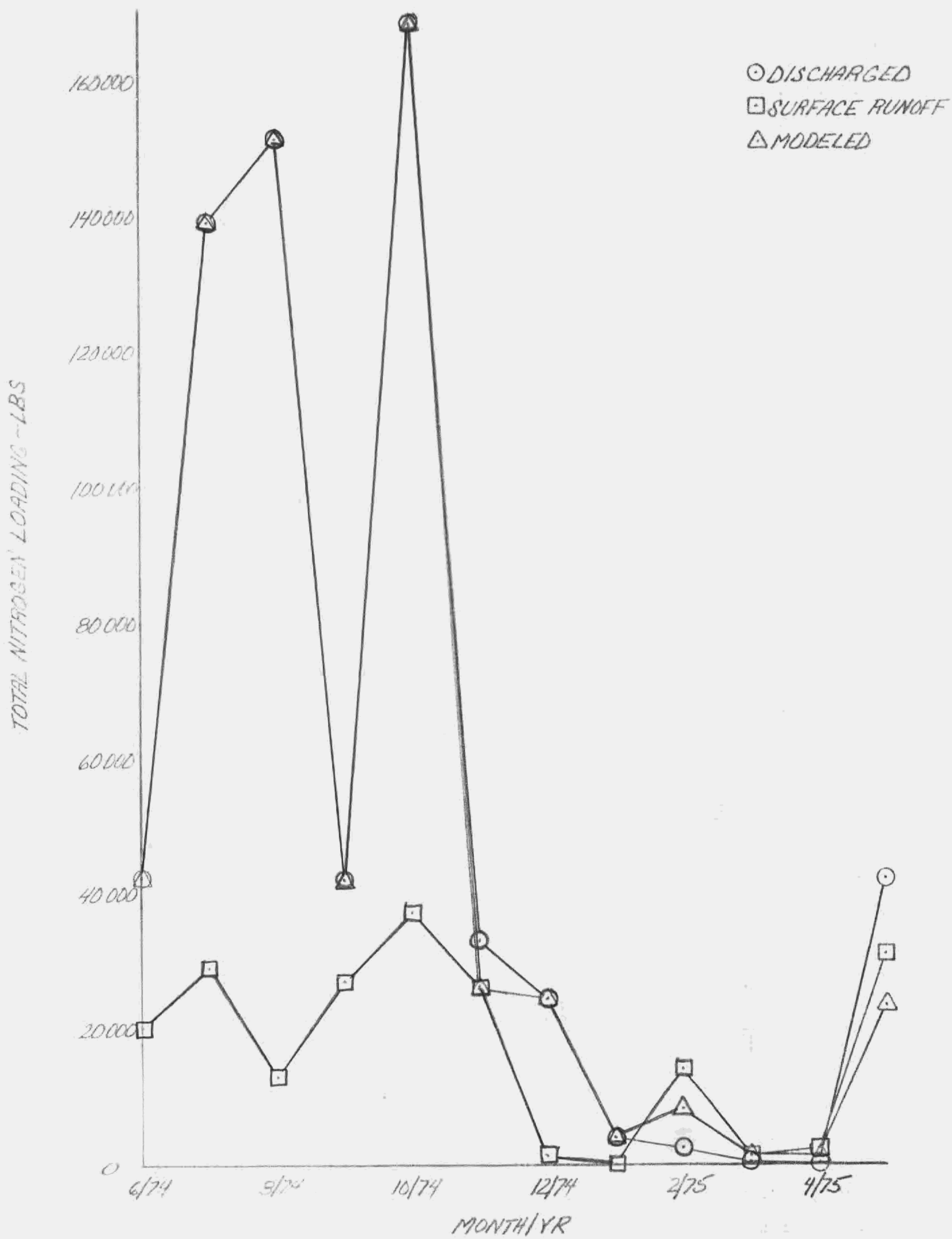


FIGURE 17
HILLSBORO + C-14 TOTAL PHOSPHORUS LOADINGS
DATA BASE PERIOD

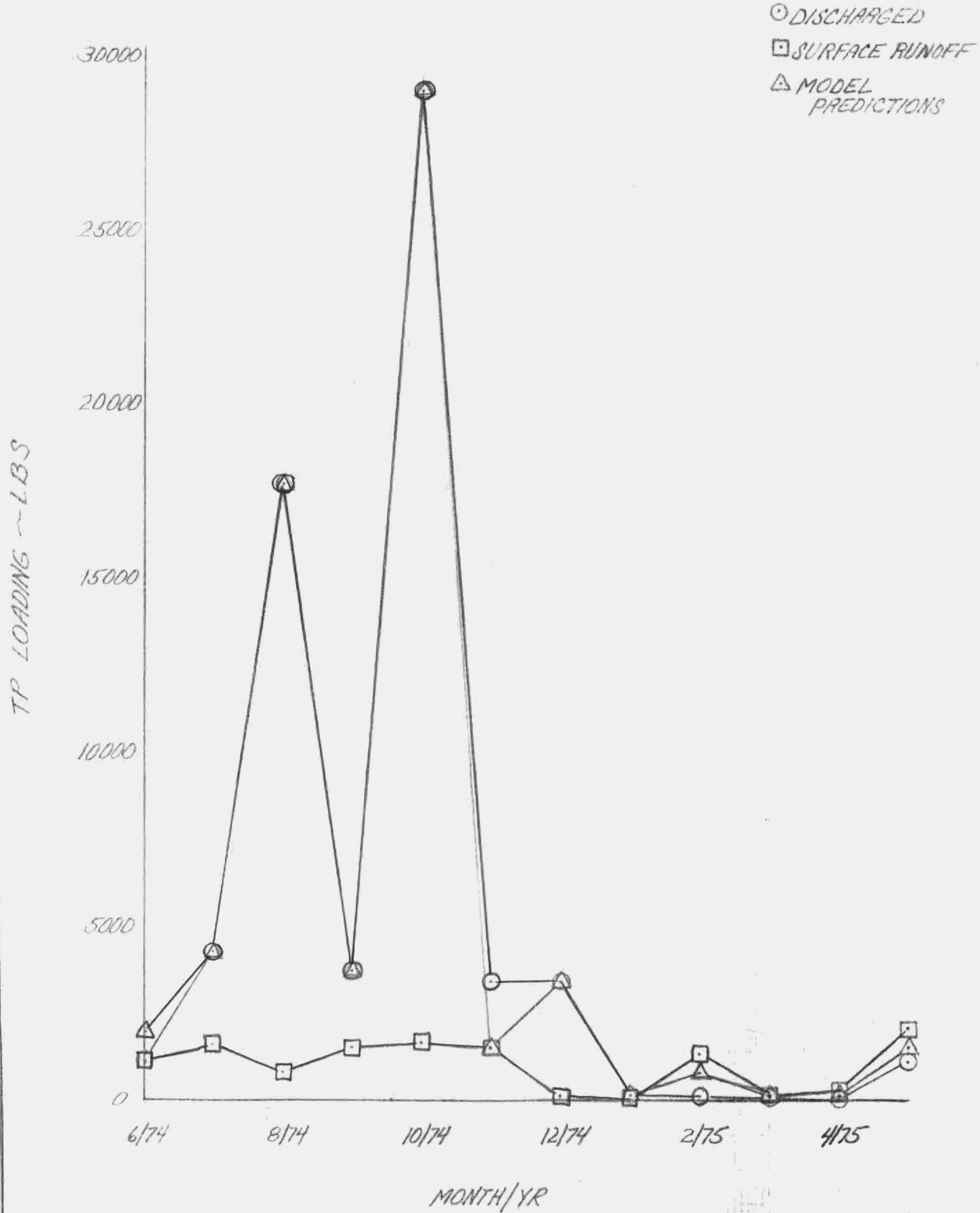


Table 24. Hillsboro + C-14 Basin Quantities and Quality Data Base Period

Date	Discharge	DATA BASE				MODELED			
		Total Nitrogen		Total Phosphorus		Total Nitrogen		Total Phosphorus	
		Loading	Conc.	Loading	Conc.	Loading	Conc.	Loading	Conc.
	(Ac-Ft.)	(lbs)	(mg/l)	(lbs)	(mg/l)	(lbs)	(mg/l)	(lbs)	(mg/l)
June 1974	11566	42436	1.35	1100	0.035	42505	1.35	1942	0.062
July	22806	139456	2.25	4277	0.069	139518	2.25	4263	0.069
August	26075	151653	2.14	17716	0.250	151602	2.14	17717	0.250
September	11103	42246	1.40	3742	0.124	42230	1.40	3740	0.124
October	42500	168634	1.46	28992	0.251	168821	1.46	29005	0.251
November	11480	33384	1.07	3401	0.109	26064	0.84	1535	0.049
December	6742	24736	1.35	3408	0.186	24662	1.35	3404	0.186
January 1975	1177	4190	1.31	179	0.056	4197	1.31	178	0.056
February	823	2908	1.30	94	0.042	8394	3.75	799	0.357
March	240	737	1.13	27	0.042	1753	2.69	167	0.257
April	40	151	1.39	3	0.028	1711	15.74	179	1.648
May	8438	42425	1.85	1101	0.048	23816	1.04	1554	0.068
Total (Avg.)	142990	652956	(1.68)	64040	(0.165)	635273	(1.63)	64483	(0.166)

2) All quality predictions are based on the data base period from 6/74 to 5/75.

3) The CLAD model is used to predict plan scenario water quantity and nutrient quality, and 1973-74 land use nutrient quality for the rainfall/discharge record of 1/63 to 12/74.

4) Nonpoint source pollution is ill defined. The nutrient pollutant accumulation rates are halved in the data calibration from those previously used in the west C-51 basin.

5. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The CLAD model estimates the quantity and quality of water discharged from a basin for some projected land use on a monthly basis.

2. Both quantity and quality computations of the model are based on mass balance principles with the levels of details being consistent with input data accuracy and the desired output.

3. Land use cover analysis, projected land uses, hourly rainfall, historical discharge reocrds, land use pollutant accumulation rates and general basin description parameters are the major input requirements of the model.

4. Discharge predictions do not consider increased water demands within the basin because such aspects are separately handled by a contemporary optimization model.

5. The model predicts water quality using at least one year of historical data (monthly or more frequent) coupled with the STORM model of the Corps of Engineers.

6. Nonpoint sources of pollution other than surface runoff are ill defined, making future quality projections difficult. The CLAD model assumes constant monthly concentrations of other nonpoint sources and sinks from year to year.

7. No mixing effects are presently considered in the model. Although stored stream or canal waters can have a significant effect on water quality during periods of low rainfall and low discharge conditions, these periods are of minimum concern in the backpumping analyses for which the model is primarily developed.

8. Point sources are considered but they are external to the model.

9. In a natural stream as opposed to canal drainage (as in our case), the variability and extent of the sink term should be assessed with additional program calibrations and/or modifications.

10. This model cannot be used to estimate peak discharges or peak pollutant concentrations. The model outputs are average monthly pollutant concentrations and discharges.

11. Future surface runoff abatement schemes for urban land uses can be simulated using the overall treatment efficiency estimations.

RECOMMENDATIONS

1. Stream or canal mixing effects should be incorporated in the CLAD model to make quality predictions of the dry season more accurate.

2. The model should be updated with more knowledge concerning other nonpoint sources and sinks with a better definition of the groundwater balance.

3. While applying the CLAD model to a natural watershed as opposed to canal drainage, several model verification and modification procedures may be necessary.

4. The CLAD model should be updated with the latest version of the STORM model so that land use loading rates in lbs/acre/day can be directly used and the SCS method of calculating runoff can be incorporated.

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EXHIBIT 7.1: Input Set for Western C-51

```
  AAAAAAAAAA   JJJJJJJJJJJ  YY        YY   QQQQQQQQQQ   FFFFFFFFFFFF   GGGGGGGGGG   DDDDDDDDDD
 AAAAAAAAAAAA  JJJJJJJJJJJ  YY        YY  QQQQQQQQQQQQ  FFFFFFFFFFFF  GGGGGGGGGGGG  DDDDDDDDDDD
 AA        AA           JJ  YY        YY  QQ        QQ  FF            GG         G  DD        DD
 AA        AA           JJ  YY        YY  QQ        QQ  FF            GG            DD        DD
 AA        AA           JJ  YY        YY  QQ        QQ  FF            GG            DD        DD
 AA        AA           JJ  YY        YY  QQ        QQ  FF            GG            DD        DD
 AA        AA           JJ  YYY      YYY  QQ        QQ  FF            GG            DD        DD
 AA        AA           JJ   YYY    YYY   QQ        QQ  FFFFFFFF      GG            DD        DD
 AAAAAAAAAAAA           JJ    YYY  YYY    QQ        QQ  FFFFFFFF      GG     GGGG   DD        DD
 AAAAAAAAAAAA           JJ      YYYY      QQ        QQ  FF            GG     GGGG   DD        DD
 AA        AA           JJ       YY       QQ        QQ  FF            GG        GG  DD        DD
 AA        AA           JJ       YY       QQ    QQ  QQ  FF            GG        GG  DD        DD
 AA        AA           JJ       YY       QQ     QQ QQ  FF            GG        GG  DD        DD
 AA        AA           JJ       YY       QQ     QQ QQ  FF            GG        GG  DD        DD
 AA        AA  JJ       JJ       YY       QQ      QQQQ  FF            GG        GG  DD        DD
 AA        AA  JJJJJJJ           YY       QQQQQQQQQQQQ  FF            GGGGGGGGGGGG  DDDDDDDDDDD
 AA        AA   JJJJJ            YY        QQQQQQQQQQ   FF             GGGGGGGGGG   DDDDDDDDDD
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77/02/16. 17.08.09.


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MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
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A1                         WEST C-51
A2       JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3                      WESTERN REACH
B1     1       0       1       0       1       1
#1     1       0       1       0       1       1
B2    10       1          621225       4
C1 LOXAHATCHEE STATION USDOC          11       0  630101   750531       1
E1 C51WEST             5      15. .000001
E218373.       .2      .9      1.       0
E3    .1     .104    .048    .078    .169    .182    .213    .216    .219    .200
E3  .156     .129    .082
F1SINGLE    20.39    21.2    100. 9999999
F2   10.  .000001 .000001    .446   .0562   .0117
F1MULTPL      .15     80.    100. 9999999
F2   10.  .000001 .000001   1.055   .2341   .0383
F1COMMCL      1.3     85.    100. 9999999
F2   10.  .000001 .000001   4.478   .3122   .1066
F1INDSTL      .12    61.1    100. 9999999
F2   10.  .000001 .000001   1.758   .4948   .0689
F1OPEN      78.04      5.    100. 9999999
```

Figure 11

```
H156477.             1.                                               .46
H2  .294  [illegible]  .048     .078     .169     .182     .213     .216     .219     .200
H2  .156     .129     .082
J1 2.705    .2705    .0213    .0206  .000825
T1     0
T2   0.0                                  3
T3.00001
#3.00001

A1                              WEST C-51 PLAN SCENARIO
A2         JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3           SCENARIO LAND USE-           ,              ,  BOD,N,P
B1      1        0        1        0        1        1
B2     10        1           621225         4
C1 LOXAHATCHEE STATION USDOC               11        0  630101   750531        1
E1 C51WEST                 2       15.  .000001
E252518.       .2     .532       1.         0
E3     .1     .104     .048     .078     .169     .182     .213     .216     .219     .200
E3  .156     .129     .082
F1SINGLE    98.46      20.     100.     9999
F2    10. .000001  .000001     .446    .0562    .0117
F1OPEN       1.54       5.     100.     9999
F2    10. .000001  .000001     .122    .0758   .00244
H122333.      .23       1.                                            .46
H2  .162     .104     .048     .078     .169     .182     .213     .216     .219     .200
H2  .156     .129     .082
J1 6.467    .6467   .03383   .04137  .001703
T1     0
T2   0.0                                  3
T3.00001

A1                        WEST C-51 PLAN SCENARIO URBAN
A2         JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3           SCENARIO LAND USE-URBAN   ,              ,  BOD,N,P
#3           SCENARIO LAND USE-URBAN   ,              ,  BOD,N,P
B1      1        0        1        0        1        1
B2     10        1           621225         4
C1 LOXAHATCHEE STATION USDOC               11        0  630101   750531        1
E1 C51WEST                 2       15.  .000001
E252518.       .2     .532       1.         0
E3     .1     .104     .048     .078     .169     .182     .213     .216     .219     .200
E3  .156     .129     .082
F1SINGLE    98.46      20.     100.     9999
F2    10. .000001  .000001     .446    .0562    .0117
F1OPEN       1.54       5.     100.     9999
F2    10. .000001  .000001     .122    .0758   .00244
H1.00001      .23       1.                                            .46
H2  .162     .104     .048     .078     .169     .182     .213     .216     .219     .200
H2  .156     .129     .082
J1 6.467    .6467   .03383   .04137  .001703
T1     0
T2   0.0                                  3
T3.00001

C51WEST           50.        21.        38.        79.        88.       100.       105.
C51WEST          106.        94.        75.        60.        40.          SWETH
C51WEST          692.       291.       516.      1088.      1208.      1369.      1437.
C51WEST         1455.      1287.      1035.       831.       544.          SWETF
   .116
C51WEST 63      3469.      7053.      6109.       547.     12599.      7309.      2999.
#51WEST 63      3469.      7053.      6109.       547.     12599.      7309.      2999.
C51WEST 63      5496.     25718.     25525.     10034.      8864.          DISH
C51WEST 64     13855.     11411.      4350.      4709.      9840.     19456.     11627.
C51WEST 64     12873.     23389.     22947.     19190.     11230.          DISH
C51WEST 65      4292.      4746.         0          0          0     11960.     32319.
C51WEST 65     19630.     11014.     55057.     42722.      6014.          DISH
```

```
C51WEST 66   56131.   17903.   24232.    6577.    3582.            DISH
C51WEST 67    4360.    5387.    1476.        0     169.   16225.   20432.
C51WEST 67   10524.   14162.   40056.   11770.    5820.            DISH
C51WEST 68    1708.    3820.    4798.      75.   20828.   90365.   51749.
C51WEST 68   22969.   23625.   44430.   14162.    2239.            DISH
C51WEST 69    7900.    3342.   12902.    4661.   15539.   31234.   18067.
C51WEST 69   22340.   24801.   42046.   33338.   15812.            DISH
C51WEST 70   11480.   15425.   45546.   16330.    7077.   27826.   20949.
C51WEST 70   17687.   14505.   17179.    2053.     194.            DISH
C51WEST 70   17687.   14505.   17179.    2053.     194.            DISH
C51WEST 71     670.     272.        0      26.    3130.   11232.   15300.
C51WEST 71   11845.   19620.    9503.   33767.   10161.            DISH
C51WEST 72    9098.    6619.    2747.   12081.   43137.   57354.   21967.
C51WEST 72   18664.   12266.    6657.   10449.    5897.            DISH
C51WEST 73    4181.    2908.    2410.    1303.    4026.   16733.   40992.
C51WEST 73   29603.   41619.   29849.    9366.    9146.            DISH
C51WEST 74   28415.    5349.    1954.      52.      26.   11466.   22746.
C51WEST 74   27868.   21697.   26051.   11677.   13127.            DISH
C51WEST 75    3695.     956.     450.       0.    4407.       0.       0.
C51WEST 75       0.       0.       0.       0.       0.            DISH

C51WEST
C51WEST
C51WEST
C51WEST
C51WEST         .52      .72      .40      .40     1.21    11.12     3.66
C51WEST        1.91     1.52     1.77      .41     2.69            ONPSCN
C51WEST        .148     .040     .040     .040     .040     .121     .256
C51WEST        .080     .074     .121     .150     .108            ONPSCP
C51WEST         0.0      0.0     .247     .247                     REFF

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         AJYQFGD.    77/02/15.FLORIDA STATE UNIVERSITY KRONOS
         AJYQFGD.    77/02/15.FLORIDA STATE UNIVERSITY KRONOS

17.03.04.JGF,T550,CM120000,MO.   FOY
17.03.07.ACCOUNT,
17.03.08.STAGEI,RI1098,7782/TAPE11.
17.04.13.MT51, ASSIGNED TO STAGEIN, VSN=****51.
17.04.22. STAGING COMPLETE.
17.04.22.CBR,,CARDS.
17.04.22. COPY COMPLETE.
17.04.23.CBR,,CARD2.
17.04.23. COPY COMPLETE.
17.04.23.CBR,,IP1.
17.04.23. COPY COMPLETE.
17.04.23.CBR,,IP2.
17.04.23. COPY COMPLETE.
17.04.23.CBR,,IP3.
17.04.23. COPY COMPLETE.
17.04.24.G,STORM,SUMMB.
17.04.46.CALL (PROG2(LFN=LAND,NAME=IP1)
17.04.49.RA,INPUT.
17.04.50.ASSIGN,MS,OUTPUT.
17.04.50.DI00, ASSIGNED TO OUTPUT.
17.16.24.STORM(IP1)
19.03.45.STOP
19.03.45.RENAME,QUAL=TAPE13.
19.03.45.RENAME,OUT=OUTPUT.
19.03.45.RA,INPUT.
19.16.03.SUMMB.
19.18.39.STOP
19.18.39.RENAME,LAND=QUALSUM.
```

EXHIBIT 7.2: CLADM Hydrologic Output for Western C-51 Using 1973-74 Land Uses and Planned Scenario

Note: SWET, DSET, NGWL are defined in the Report and these notations are also used in subsequent Exhibits No. 7.7 and 7.11

WEST C-51 BASIN

			73-74 LAND USES						SCENARIO LAND USES			
		RAINFALL	DISCHARGE	RUNOFF	SWET	DSET	NGWL	NGWL	RUNOFF	DSET	SWET	DISCHARGE
63	1	4678	3469	187	50	3895	-2736	-3053	437	2966	692	4073
#3	1	4678	3469	187	50	3895	-2736	-3053	437	2966	692	4073
63	2	19024	7053	3056	21	6236	5714	5120	3930	3614	291	9999
63	3	12662	6109	1934	38	4572	1943	1741	2433	3122	516	7283
63	4	0	547	0	79	0	-626	-699	0	0	1088	0
63	5	44099	12599	8109	88	10171	21241	19033	9544	6674	1208	16794
63	6	30813	7309	4553	100	11761	11643	10433	5801	8065	1369	10946
63	7	16280	2999	2121	105	7406	5770	5170	2807	5273	1437	4400
63	8	36240	5496	5302	106	14056	16582	14858	6986	8844	1455	11083
63	9	52832	25718	9543	94	12901	14119	12651	11103	9291	1287	29603
63	10	14221	25525	1435	75	8219	-19598	-21871	2058	6149	1035	28908
63	11	10354	10034	1185	60	5396	-5136	-5732	1622	3994	831	11261
63	12	42290	8864	9231	40	3665	29721	26632	10292	1930	544	13184
		283493	115722	46656	856	88278	78637	64284	57013	59922	11753	147534
#		283493	115722	46656	856	88278	78637	64284	57013	59922	11753	147534
64	1	11976	13855	1310	50	6495	-8424	-9401	1934	4393	692	16292
64	2	23079	11411	4366	21	4810	6837	6126	5052	3265	291	13397
64	3	19149	4350	3306	38	5317	9444	8462	4054	3250	516	6921
64	4	34493	4709	6050	79	9178	20527	18393	7360	5630	1088	9382
64	5	14346	9840	2183	88	5212	-794	-886	2745	3584	1208	10440
64	6	72355	19456	14533	100	11546	41253	36965	16218	8757	1369	25264
64	7	21831	11627	2058	105	13219	-3120	-3482	3306	8867	1437	15009
64	8	59319	12873	11103	106	12863	33477	29997	12912	8685	1455	19182
64	9	22018	23389	2121	94	13145	-14610	-16305	3244	9299	1287	27737
64	10	62001	22947	13036	75	7455	31524	28247	14534	5007	1035	27712
64	11	14097	19190	2245	60	4701	-9854	-10997	2682	3579	831	20684
64	12	13847	11230	1871	40	6018	-3441	-3840	2682	3329	544	13814
#4	12	13847	11230	1871	40	6018	-3441	-3840	2682	3329	544	13814
		368511	164877	64182	856	99959	102819	83281	76723	67645	11753	205832
65	1	2308	4292	62	50	2047	-4081	-4554	250	1329	692	4841
65	2	20958	4746	3805	21	5038	11153	9994	4242	4325	291	6348
65	3	6674	0	437	38	4847	1789	1603	998	2760	516	1795
65	4	15906	0	2932	79	3639	12188	10921	3555	1963	1088	1934
65	5	6736	0	811	88	3344	3304	2961	1123	2334	1208	233
65	6	84955	11960	17215	100	12923	59972	53738	19461	8637	1369	21211
65	7	69299	32319	12413	105	17363	19512	17484	14409	12794	1437	37584
65	8	20272	19630	2495	106	9832	-9296	-10374	3618	6085	1455	23106
65	9	35741	11014	4928	94	15123	9510	8522	6300	11036	1287	14896
65	10	86327	55057	18650	75	8293	22902	20522	20646	5362	1035	59408
65	11	2370	42722	374	60	804	-41216	-45997	437	658	831	46878
#5	11	2370	42722	374	60	804	-41216	-45997	437	658	831	46878
65	12	8171	6014	998	40	3995	-1878	-2096	1497	2301	544	7422
		359717	187754	65120	856	87248	83859	62722	76536	59584	11753	225658
66	1	40606	18109	7485	50	9288	13159	11791	8982	5383	692	22740
66	2	28755	20071	5988	21	3700	4963	4447	6612	2826	291	21191
66	3	7797	11867	312	38	6492	-10600	-11830	936	4128	516	14983
66	4	36115	4810	7298	79	5580	25646	22980	8358	3338	1088	8709
66	5	39421	10020	6799	88	10974	18339	16433	8046	7867	1208	13913
66	6	91691	36434	17964	100	16528	38629	34614	20646	10726	1369	44982
66	7	37113	44618	5614	105	13625	-21235	-23698	7236	8739	1437	50635
66	8	73353	36131	13972	106	14892	22224	19914	15968	10733	1455	41251
66	9	54640	17903	9231	94	16015	20628	18484	10978	11590	1287	23279
#6	9	54640	17903	9231	94	16015	20628	18484	10978	11590	1287	23279
66	10	27320	24232	4241	75	9573	-6560	-7321	5302	6529	1035	27077
66	11	6425	6577	249	60	5381	-5593	-6242	686	3734	831	8102
66	12	10916	3582	1060	40	6479	815	730	1622	4556	544	5086
		454152	234354	80213	856	118527	100415	80303	95372	80149	11753	281947
67	1	5489	4360	374	50	3923	-2844	-3174	561	3288	692	4683

67	3	49[illegible]	1476	499	38	2902	574	514	873	1566	516	2394
67	4		0	0	79	0	-79	-88	0	0	1088	0
67	5	3493	169	62	88	3232	4	4	187	2759	1208	0
67	6	72105	16225	12163	100	21213	34567	30974	14721	14378	1369	23907
67	7	69423	20432	13972	105	10963	37923	33981	15656	8027	1437	25978
67	8	23328	10524	3181	106	10018	2680	2401	4304	6450	1455	13022
67	8	23328	10524	3181	106	10018	2680	2401	4304	6450	1455	13022
67	9	45658	14162	8109	94	11730	19672	17627	9606	7989	1287	18755
67	10	34181	40056	5239	75	12259	-18209	-20321	6737	7764	1035	45703
67	11	4366	11770	561	60	2017	-9481	-10581	749	1431	831	12685
67	12	13847	5820	2308	40	4191	3796	3401	2932	2351	544	7551
		301331	130381	51333	856	86542	83552	68134	62002	58195	11753	163249
68	1	4429	1708	624	50	1819	852	763	811	1249	692	1725
68	2	19773	3820	3368	21	5680	10252	9186	4179	3384	291	6912
68	3	20833	4798	4117	38	3608	12389	11101	4741	2243	516	6973
68	4	4366	75	125	79	3844	368	330	437	2654	1088	294
68	5	53081	20828	9044	88	15238	16927	15168	10916	10275	1208	26430
68	6	127183	90365	26821	100	14959	21759	19497	29629	10994	1369	95323
68	7	59693	51749	11165	105	12977	-5138	-5734	13037	8570	1437	55420
68	7	59693	51749	11165	105	12977	-5138	-5734	13037	8570	1437	55420
68	8	30938	22969	4553	106	11886	-4023	-4490	5863	7945	1455	26028
68	9	29379	23625	3867	94	13198	-7538	-8412	5240	8832	1287	27672
68	10	32622	44430	5926	75	7829	-19712	-21999	6737	6204	1035	47382
68	11	18213	14162	3555	60	3337	654	586	4117	2069	831	14727
68	12	0	2239	0	40	0	-2279	-2543	0	0	544	1999
		400510	280768	73165	856	94375	24511	13454	85707	64419	11753	310884
69	1	11976	7900	1996	50	3624	402	360	2370	2681	692	8243
69	2	11539	3342	2058	21	2927	5249	4703	2495	1755	291	4790
69	3	28880	12902	5177	38	7218	8722	7815	6300	4174	516	16375
69	4	8233	4661	1123	79	3536	-43	-48	1497	2363	1088	4830
69	5	43912	15539	7423	88	12855	15430	13826	8857	9178	1208	19700
69	6	107035	31234	21519	100	16996	58705	52603	24264	11883	1369	41180
69	6	107035	31234	21519	100	16996	58705	52603	24264	11883	1369	41180
69	7	27507	18067	3867	105	11326	-1991	-2222	4990	7939	1437	20353
69	8	32872	22340	4054	106	15908	-5482	-6118	5676	10612	1455	26923
69	9	51147	24801	8046	94	17480	8772	7860	9855	12500	1287	29500
69	10	73977	42046	14284	75	14211	17645	15811	16031	11112	1035	46019
69	11	27570	33338	5364	60	5125	-10953	-12224	6050	3843	831	35120
69	12	7984	15812	1247	40	2764	-10632	-11865	1559	1869	544	17436
		432632	231982	76158	856	113970	85824	70503	89944	79909	11753	270467
70	1	14159	11480	1622	50	7374	-4745	-5295	2495	4375	692	14387
70	2	15032	15425	2495	21	4593	-5007	-5588	2994	3291	291	17038
70	3	85204	45546	18775	38	6648	32972	29545	20709	3994	516	51149
70	4	4366	16330	686	79	1495	-13538	-15108	936	697	1088	17689
70	4	4366	16330	686	79	1495	-13538	-15108	936	697	1088	17689
70	5	35117	7077	6612	88	7453	20499	18368	7547	5520	1208	10021
70	6	55888	27826	10292	100	12826	15136	13563	12101	8434	1369	32522
70	7	40294	20949	6050	105	14979	4261	3818	7859	9474	1437	25565
70	8	27320	17687	3930	106	10878	-1351	-1508	4990	7752	1455	19621
70	9	46656	14505	6612	94	18992	13065	11707	8483	13390	1287	20272
70	10	19710	17179	2557	75	9010	-6554	-7314	3493	6012	1035	19977
70	11	0	2053	0	60	0	-2113	-2358	0	0	831	1527
70	12	4366	194	249	40	3322	810	726	561	2165	544	931
		348112	196251	59880	856	97570	53435	40555	72168	65104	11753	230700
71	1	10916	670	1684	50	3869	6327	5669	2121	2599	692	1956
71	2	5177	272	374	21	3611	1273	1141	749	2242	291	1503
71	3	2058	0	62	38	1797	223	200	250	1080	516	262
71	3	2058	0	62	38	1797	223	200	250	1080	516	262
71	4	10292	26	1372	79	4550	5637	5051	2058	2220	1088	1933
71	5	28131	3130	5302	88	5947	18966	16995	6238	3670	1208	6258
71	6	51459	11232	8608	100	15443	24684	22118	10853	8898	1369	19074
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	105	16758	8744	7477	7610	10265	1437	20928

71	8	2856[illegible]	11845	3742	106	12909	3708	3323	5302	7776	1455	16014
71	9	3798[illegible]	19620	5926	94	13193	5079	4551	7485	8633	1287	23515
71	10	37113	9503	5738	75	13103	14432	12932	7360	8249	1035	14897
71	11	53642	33767	11539	60	5360	14455	12953	12538	4476	831	35382
71	12	18089	10161	3493	40	3474	4414	3955	4054	2189	544	11401
		323538	115526	53516	856	99614	107542	96364	66618	62297	11753	153124
72	1	12537	9098	1185	50	7579	-4190	-4676	2183	3976	692	12545
72	2	8296	6619	686	21	5425	-3769	-4206	1248	3404	291	8807
[illegible]2	2	8296	6619	686	21	5425	-3769	-4206	1248	3404	291	8807
72	3	25574	2747	5239	38	3651	19138	17149	6238	1113	516	6796
72	4	58757	12081	11477	79	10736	35861	32134	13037	7634	1088	17901
72	5	61003	43137	10354	88	17679	99	89	12538	11837	1208	47869
72	6	77532	57354	14409	100	17245	2833	2539	16654	12222	1369	61402
72	7	37051	21967	5676	105	13301	1678	1504	6986	9655	1437	24455
72	8	22143	18664	1684	106	15097	-11724	-13084	3181	9668	1455	24104
72	9	9231	12266	811	94	5839	-8968	-10008	1372	3850	1287	14102
72	10	13348	6657	1746	75	6041	575	515	2370	4053	1035	7745
72	11	7485	10449	686	60	4614	-7638	-8524	1060	3327	831	11851
72	12	11539	5897	1559	40	5015	587	526	2058	3467	544	7002
		344496	206936	55512	856	112222	24482	13956	68925	74206	11753	244581
73	1	31437	4181	5801	50	7165	20041	17958	6737	5019	692	7768
[illegible]3	1	31437	4181	5801	50	7165	20041	17958	6737	5019	692	7768
73	2	14908	2908	2245	21	5512	6467	5795	2745	4145	291	4677
73	3	14159	2410	2308	38	4503	7208	6459	2932	2663	516	4521
73	4	4366	1303	374	79	2800	184	165	686	1676	1088	1437
73	5	15531	4026	2433	88	5353	6064	5434	2932	4035	1208	4854
73	6	47530	16733	8608	100	11514	19183	17189	10230	7414	1369	21558
73	7	64683	40992	11851	105	15096	8490	7608	13972	9891	1437	45747
73	8	52457	29603	7734	106	20095	2653	2377	9980	13320	1455	35305
73	9	47343	41619	7797	94	14720	-9090	-10144	9606	9673	1287	46527
73	10	26322	29849	3555	75	11446	-15048	-16794	4741	7732	1035	34349
73	11	10167	9366	1622	60	3382	-2641	-2947	1996	2340	831	9943
73	12	19648	9146	3368	40	5555	4907	4397	4179	3259	544	11448
		348551	192136	57696	856	107141	48418	37495	70736	71167	11753	228136
[illegible]		348551	192136	57696	856	107141	48418	37495	70736	71167	11753	228136
74	1	34868	28415	7235	50	4593	1810	1622	8109	3069	692	29485
74	2	3056	5349	125	21	2534	-4848	-5410	250	2078	291	6097
74	3	11103	1954	2245	38	1707	7404	6634	2620	829	516	3124
74	4	6487	52	811	79	3094	3262	2923	1185	1839	1088	637
74	5	16467	26	2121	88	7594	8759	7849	2807	5460	1208	1950
74	6	44598	11466	7485	100	13280	19752	17699	9169	8641	1369	16889
74	7	73727	22746	13161	105	18659	32217	28868	15656	12331	1437	31091
74	8	26696	27868	3493	106	12081	-13359	-14909	4741	8106	1455	32044
74	9	42353	21697	6487	94	15210	5352	4796	8421	9331	1287	26939
74	10	18401	26051	3493	75	3785	-11510	-12845	4117	2256	1035	27955
74	11	26010	11677	4429	60	7480	6793	6087	5177	5708	831	13384
74	12	11976	13127	2121	40	3103	-4294	-4792	2433	2436	544	13788
[illegible]4	12	11976	13127	2121	40	3103	-4294	-4792	2433	2436	544	13788
		315742	170428	53206	856	93120	51338	38521	64685	62084	11753	203384
75	1	1372	3695	0	50	1372	-3745	-4179	62	1128	692	3731
75	2	1622	956	0	21	1622	-977	-1090	62	1377	291	1044
75	3	4429	450	374	38	2863	1078	966	624	1983	516	964
75	4	4553	0	125	79	4031	443	397	437	2841	1088	227
75	5	25761	4407	3056	88	12973	8293	7431	4179	9372	1208	7750
75	6	0	0	0	100	0	-100	-112	0	0	1369	0
75	7	0	0	0	105	0	-105	-117	0	0	1437	0
75	8	0	0	0	106	0	-106	-118	0	0	1455	0
75	9	0	0	0	94	0	-94	-105	0	0	1287	0
75	10	0	0	0	75	0	-75	-84	0	0	1035	0
75	11	0	0	0	60	0	-60	-67	0	0	831	0
75	12	0	0	0	40	0	-40	-45	0	0	544	0
		37737	9508	3555	856	22861	4512	2877	5364	16701	11753	13717

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EXHIBIT 7.3: CLADM Quality Output for Western C-51
Using 1973-74 Land Uses.

TLSS = Total Loading for Suspended Solids.

TLBOD = Total Loading for Biochemical Oxygen Demand (BOD)

TLN = Total Loading for Nitrogen

TLP = Total Loading for Phosphorus

TCSS = Total Concentration for Suspended Solids

TCBOD = Total Concentration for BOD

TCN = Total Concentration for Nitrogen

TCP = Total Concentration for Phosphorus

The same notations are used in subsequent exhibits No. 7.4, 7.8, 7.9, 7.12 and 7.13.

AJYIEQM

77/02/12. 18.37.53.

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WEST C-51 BASIN
1973-4 LAND USES

		TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TCN	TCP
63	1	0	11910	8268	1599	0.00	1.26	.88	.170
63	2	224620	17780	14412	880	11.72	.93	.75	.046
63	2	224620	17780	14412	880	11.72	.93	.75	.046
63	3	671616	19088	13861	983	40.45	1.15	.83	.059
63	4	0	0	595	59	0.00	0.00	.40	.040
63	5	1228313	44568	39971	1801	35.87	1.30	1.17	.053
63	6	1245161	21929	96469	1570	62.68	1.10	4.86	.079
63	7	691422	14008	16610	1023	84.83	1.72	2.04	.125
63	8	1807457	31709	20100	1003	121.01	2.12	1.35	.067
63	9	2984906	44517	101170	4776	42.71	.64	1.45	.068
63	10	457516	12088	121956	8260	6.60	.17	1.76	.119
63	11	559296	16319	17751	4056	20.51	.60	.65	.149
63	12	1383549	54057	38717	1780	57.43	2.24	1.61	.074
		11253856	287973	489881	27791	35.78	.92	1.56	.088
64	1	437633	14649	24477	5442	11.62	.39	.65	.145
64	2	495164	23467	28738	1497	15.97	.76	.93	.048
64	3	1623902	26931	17814	940	137.36	2.28	1.51	.080
64	4	600061	29315	20184	946	46.89	2.29	1.58	.074
64	4	600061	29315	20184	946	46.89	2.29	1.58	.074
64	5	872533	17430	35045	1346	32.63	.65	1.31	.050
64	6	3737916	51292	189124	3391	70.69	.97	3.58	.064
64	7	497138	17125	102397	7120	15.73	.54	3.26	.225

64	8	22[illegible]41	47909	46033	2021	64.73	1.37	1.32	.058
64	9	6[illegible]82	19305	97384	4814	10.98	.30	1.53	.076
64	10	905950	44448	81596	4771	14.53	.71	1.31	.077
64	11	397967	15755	25759	7326	7.63	.30	.49	.140
64	12	516646	16526	76154	3196	16.93	.54	2.50	.105
		13047733	324152	745304	42811	29.12	.72	1.66	.096
65	1	0	13334	10043	2013	0.00	1.14	.86	.173
65	2	1327361	23220	15843	806	102.91	1.80	1.23	.063
65	3	0	0	0	0	I	I	I	I
65	4	0	0	0	0	I	I	I	I
65	5	0	0	0	0	I	I	I	I
65	6	3158144	68409	59064	2484	97.16	2.10	1.82	.076
65	7	3481984	48454	236153	15526	39.64	.55	2.69	.177
15	7	3481984	48454	236153	15526	39.64	.55	2.69	.177
65	8	764644	18231	98492	4246	14.33	.34	1.85	.080
65	9	1744828	27601	42653	2081	58.29	.92	1.42	.070
65	10	1219242	46212	211226	13564	8.15	.31	1.41	.091
65	11	57316	786	47727	17289	.49	.01	.41	.149
65	12	167647	28557	46251	2161	10.26	1.75	2.83	.132
		11921166	274804	767453	60171	23.36	.54	1.50	.118
66	1	1528019	23850	30254	5017	31.05	.48	.61	.102
66	2	54048	18977	38840	2103	.99	.35	.71	.039
66	3	20468	14324	17034	1594	.63	.44	.53	.049
66	4	176506	15881	9199	473	13.50	1.21	.70	.036
66	5	1354381	24134	25012	1080	49.73	.89	.92	.040
66	6	2315619	38096	587100	7367	23.39	.38	5.93	.074
66	7	1028308	21599	399923	27769	8.48	.18	3.30	.229
66	8	2438310	31981	137491	5861	24.83	.33	1.40	.060
66	9	1965806	23839	53346	2539	40.40	.49	1.10	.052
16	9	1965806	23839	53346	2539	40.40	.49	1.10	.052
66	10	818969	20438	106667	7153	12.44	.31	1.62	.109
66	11	16788	12851	11056	2884	.94	.72	.62	.161
66	12	204826	12107	23195	1049	21.04	1.24	2.38	.108
		11922048	258077	1439117	64890	18.72	.41	2.26	.102
67	1	75733	18062	11534	2036	6.39	1.52	.97	.172
67	2	1216442	29305	21513	1011	83.09	2.00	1.47	.069
67	3	193663	16942	7237	526	48.28	4.22	1.80	.131
67	4	0	0	0	0	I	I	I	I
67	5	0	22183	7114	532	0.00	48.30	15.49	1.157
67	6	4604677	55033	163553	3181	104.42	1.25	3.71	.072
67	7	2373455	33615	92100	5689	42.74	.61	1.66	.102
67	8	820891	23696	49622	2251	28.70	.83	1.73	.079
67	9	2304389	40463	54572	2563	59.87	1.05	1.42	.067
67	10	2217320	28221	187652	12380	20.37	.26	1.72	.114
67	11	301592	12125	17759	4891	9.43	.38	.56	.153
17	11	301592	12125	17759	4891	9.43	.38	.56	.153
67	12	365182	29254	41714	1881	23.09	1.85	2.64	.119
		14473344	308899	654371	36939	40.85	.87	1.85	.104
68	1	437347	9235	6628	705	94.22	1.99	1.43	.152
68	2	1441482	40657	26010	1296	138.85	3.92	2.51	.125
68	3	549985	27763	22501	1032	42.18	2.13	1.73	.079
68	4	0	11565	3526	271	0.00	56.74	17.30	1.328
68	5	3182001	45498	74430	2851	56.21	.80	1.31	.050
68	6	3839770	56262	1968014	22920	15.63	.23	8.01	.093
68	7	1536876	26598	419814	29044	10.93	.19	2.98	.207
68	8	1409255	24568	110435	4749	22.58	.39	1.77	.076
68	9	1215828	22470	94811	4648	18.94	.35	1.48	.072
68	10	887188	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

68	11	98[illegible]	15817	21760	4813	25.50	.41	.57	.125
68	12	[illegible]0	0	16369	657	0.00	0.00	2.69	.108
		15477268	305310	2966924	86458	20.28	.40	3.89	.113
■		15477268	305310	2966924	86458	20.28	.40	3.89	.113
69	1	486485	28788	19657	3109	22.66	1.34	.92	.145
69	2	572726	22412	12332	734	63.06	2.47	1.36	.081
69	3	1292809	26885	23336	1626	36.87	.77	.67	.046
69	4	218012	16475	10005	797	17.21	1.30	.79	.063
69	5	1348981	22861	40695	1579	31.94	.54	.96	.037
69	6	3619821	42206	325348	4619	42.64	.50	3.83	.054
69	7	828281	20263	151744	10454	16.87	.41	3.09	.213
69	8	937900	19099	105635	4536	15.45	.31	1.74	.075
69	9	1879613	28318	87649	4259	27.89	.42	1.30	.063
69	10	1673314	32965	157536	10225	14.64	.29	1.38	.089
69	11	645751	17060	39739	11881	7.13	.19	.44	.131
69	12	263957	7428	110123	4481	6.14	.17	2.56	.104
		13767650	284760	1083799	58298	21.84	.45	1.72	.092
70	1	545444	26776	24939	4658	17.48	.86	.80	.149
70	2	1055514	15834	35633	1905	25.18	.38	.85	.045
■0	2	1055514	15834	35633	1905	25.18	.38	.85	.045
70	3	1967009	54758	71699	4791	15.89	.44	.58	.039
70	4	88721	4837	18944	1825	2.00	.11	.43	.041
70	5	1557929	53290	36329	1728	81.00	2.77	1.89	.090
70	6	2345855	36356	558441	7021	31.02	.48	7.38	.093
70	7	1882373	28368	166665	11259	33.06	.50	2.93	.198
70	8	1258373	22396	84801	3666	26.18	.47	1.76	.076
70	9	2322623	33542	54941	2652	58.92	.85	1.39	.067
70	10	787424	19009	80241	5348	16.87	.41	1.72	.115
70	11	0	0	2288	837	0.00	0.00	.41	.150
70	12	56279	21930	6979	521	106.74	41.59	13.24	.989
		13867544	317096	1141899	46212	26.00	.59	2.14	.087
71	1	397055	6534	4063	201	218.05	3.59	2.23	.110
71	2	95592	11613	4039	284	129.31	15.71	5.46	.385
71	3	0	0	0	0	I	I	I	I
71	4	20628	602	291	17	291.93	8.52	4.12	.235
71	5	807090	25373	21180	905	94.88	2.98	2.49	.106
■1	5	807090	25373	21180	905	94.88	2.98	2.49	.106
71	6	3856835	57420	122137	2792	126.35	1.88	4.00	.091
71	7	1661743	33191	119731	7794	39.96	.80	2.88	.187
71	8	1393380	24929	56928	2515	43.28	.77	1.77	.078
71	9	1807857	26277	74008	3588	33.90	.49	1.39	.067
71	10	1618104	26942	34762	2065	62.65	1.04	1.35	.080
71	11	1969475	26194	48241	10033	21.46	.29	.53	.109
71	12	81618	28799	63169	2762	2.96	1.04	2.29	.100
		13709377	267873	548550	32955	43.66	.85	1.75	.105
72	1	457896	18868	19323	3681	18.52	.76	.78	.149
72	2	340123	11227	16807	950	18.91	.62	.93	.053
72	3	1015992	22625	14929	716	136.09	3.03	2.00	.096
72	4	994667	44014	34906	1578	30.29	1.34	1.06	.048
72	5	1763735	34499	132737	4706	15.04	.29	1.13	.040
72	6	2529520	30135	1320249	15134	16.23	.19	8.47	.097
72	7	957070	22480	173893	11978	16.03	.38	2.91	.201
■2	7	957070	22480	173893	11978	16.03	.38	2.91	.201
72	8	352797	15785	94794	4105	6.96	.31	1.87	.081
72	9	248407	12882	52543	2635	7.45	.39	1.58	.079
72	10	769163	17590	32997	2121	42.51	.97	1.82	.117
72	11	239880	15457	16843	4372	8.45	.54	.59	.154

		10310902	264692	1950914	53774	18.33	.47	3.47	.096
73	1	842791	24084	15496	752	74.17	2.12	1.36	.066
73	2	815715	15588	10303	536	103.21	1.97	1.30	.068
73	3	987382	23238	12345	674	150.75	3.55	1.88	.103
73	4	188270	15619	6753	489	53.16	4.41	1.91	.138
73	5	709371	21952	20845	892	64.83	2.01	1.91	.082
73	6	3208268	59222	290767	4687	70.55	1.30	6.39	.103
73	7	1129934	45599	325308	21842	10.14	.41	2.92	.196
73	8	1315851	32484	135501	5796	16.36	.40	1.68	.072
73	9	1817872	24060	156535	7585	16.07	.21	1.38	.067
73	9	1817872	24060	156535	7585	16.07	.21	1.38	.067
73	10	1063115	19518	137980	9233	13.10	.24	1.70	.114
73	11	436471	16289	15871	3591	17.15	.64	.62	.141
73	12	861874	20915	53113	2291	34.67	.84	2.14	.092
		13376914	318568	1180816	58368	25.62	.61	2.26	.112
74	1	787888	25091	46906	9323	10.20	.32	.61	.121
74	2	0	12749	14109	866	0.00	.88	.97	.060
74	3	347036	14876	6344	391	65.35	2.80	1.19	.074
74	4	7139	908	314	22	50.51	6.43	2.22	.157
74	5	5736	287	118	7	81.18	4.07	1.66	.105
74	6	1828869	28093	138413	2187	58.69	.90	4.44	.070
74	7	3135337	37480	123120	7924	50.72	.61	1.99	.128
74	8	605434	15699	134474	5741	7.99	.21	1.78	.076
74	9	1772279	29324	81016	3959	30.06	.50	1.37	.067
74	10	941557	12409	117207	7822	13.30	.18	1.66	.110
74	11	2298702	39484	32100	4157	72.43	1.24	1.01	.131
74	11	2298702	39484	32100	4157	72.43	1.24	1.01	.131
74	12	1201301	16675	91811	3766	33.67	.47	2.57	.106
		12931279	233075	785930	46166	27.92	.50	1.70	.100
75	1	0	10057	8288	1722	0.00	1.00	.83	.172
75	2	0	6990	4002	268	0.00	2.69	1.54	.103
75	3	184811	23395	8179	579	151.11	19.13	6.69	.474
75	4	0	0	0	0	I	I	I	I
75	5	692068	28708	22020	1024	57.78	2.40	1.84	.085
75	6	0	0	0	0	I	I	I	I
75	7	0	0	0	0	I	I	I	I
75	8	0	0	0	0	I	I	I	I
75	9	0	0	0	0	I	I	I	I
75	10	0	0	0	0	I	I	I	I
75	11	0	0	0	0	I	I	I	I
75	12	0	0	0	0	I	I	I	I
		876879	69150	42488	3593	33.93	2.68	1.64	.139

AJYQEQH. 18.14.30. 77/02/12.

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THIS IS D I S P O S E D OUTPUT.

IT WILL NOT HAVE A CARD DECK.

PLEASE PUT OUT FOR USER 9364003

EXHIBIT 7.4: CLADM Quality Output for Western C-51 Using Planned Scenario

Note: Notations Used in This Exhibit is the same in Exhibit 7.3

AJYIFGD

77/02/16. 17.10.00.

WEST C-51 BASIN
PLAN SCENARIO LAND USES

		TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TGN	TGP
63	1	43749	56205	10819	2578	3.95	5.08	.98	.233
63	2	1101550	91049	27152	2632	40.54	3.35	1.00	.097
63	3	159807	76821	19517	2229	8.07	3.88	.99	.113
63	3	159807	76821	19517	2229	8.07	3.88	.99	.113
63	4	0	0	0	0	I	I	I	I
63	5	1803205	67682	74212	5026	39.51	1.48	1.63	.110
63	6	1953479	76819	180305	3681	65.67	2.58	6.06	.124
63	7	471183	50283	29365	2337	39.40	4.20	2.46	.195
63	8	3426856	106767	51760	3547	113.77	3.54	1.72	.118
63	9	4354717	95774	117218	6467	54.13	1.19	1.46	.080
63	10	709378	46437	137821	9860	9.03	.59	1.75	.126
63	11	911842	65791	22462	5375	29.79	2.15	.73	.176
63	12	1182709	135580	64761	4354	33.01	3.78	1.81	.122
		16118475	869208	735392	48084	40.20	2.17	1.83	.120
64	1	774662	55994	30258	7004	17.50	1.26	.68	.158
64	2	1204766	75380	36592	2748	33.09	2.07	1.00	.075
64	3	1165904	81124	23705	2259	61.98	4.31	1.26	.120
64	4	1434058	101126	32188	2766	56.24	3.97	1.26	.108
64	5	1118847	59525	37641	2189	39.43	2.10	1.33	.077
64	5	1118847	59525	37641	2189	39.43	2.10	1.33	.077
64	6	2984499	96861	312101	5683	43.47	1.41	4.55	.083

64 8	2388410	100826	74024	4215	45.81	1.93	1.42	.081
64 9	1[illegible]87	72892	114970	6548	15.21	.97	1.53	.087
64 10	29[illegible]3023	104008	108516	7339	39.24	1.38	1.44	.097
64 11	644001	66628	30282	8756	11.46	1.19	.54	.156
64 12	970156	68449	93703	4772	25.84	1.82	2.50	.127
	17866754	955819	1023793	64036	31.94	1.71	1.83	.114
65 1	46064	55115	12077	2942	3.50	4.19	.92	.224
65 2	1943696	88678	24128	2291	112.66	5.14	1.40	.133
65 3	348168	49865	7728	1127	71.37	10.22	1.58	.231
65 4	322859	57758	13886	1366	61.42	10.99	2.64	.260
65 5	170695	12894	2250	282	269.56	20.36	3.55	.445
65 6	3336270	132115	126537	4838	57.87	2.29	2.20	.084
65 6	3336270	132115	126537	4838	57.87	2.29	2.20	.084
65 7	3597863	91882	266481	18673	35.22	.90	2.61	.183
65 8	1119718	67857	114307	5756	17.83	1.08	1.82	.092
65 9	2570267	83940	58753	3796	63.49	2.07	1.45	.094
65 10	2300266	98978	233135	15708	14.25	.61	1.44	.097
65 11	89776	1995	52471	18987	.70	.02	.41	.149
65 12	955440	42648	62709	4707	47.37	2.11	3.11	.233
	16801082	783725	974462	80473	27.40	1.28	1.59	.131
66 1	3852609	86335	56364	8015	62.34	1.40	.91	.130
66 2	566987	67145	50132	3321	9.84	1.17	.87	.058
66 3	176722	68423	22913	2905	4.34	1.68	.56	.071
66 4	773498	85771	24999	2176	32.68	3.62	1.06	.092
66 5	2197202	83652	40311	2640	58.11	2.21	1.07	.070
66 6	2847220	88084	772537	10518	23.29	.72	6.32	.086
66 7	1615028	77040	448642	31973	11.74	.56	3.26	.232
66 8	2491016	83232	159844	7699	22.22	.74	1.43	.069
66 8	2491016	83232	159844	7699	22.22	.74	1.43	.069
66 9	2263840	54050	69370	3903	35.78	.85	1.10	.062
66 10	971968	72644	117483	8750	13.21	.99	1.60	.119
66 11	227138	67158	16080	4384	10.32	3.05	.73	.199
66 12	799287	59208	35746	2314	57.82	4.28	2.59	.167
	18782515	892742	1814421	88598	24.51	1.17	2.37	.116
67 1	303210	86752	15981	3419	23.82	6.82	1.26	.269
67 2	869154	84847	36654	2609	37.30	3.64	1.57	.112
67 3	475299	79731	12146	1814	73.05	12.25	1.87	.279
67 4	0	0	0	0	I	I	I	I
67 5	0	0	0	0	I	I	I	I
67 6	5712870	165396	344914	7679	87.93	2.55	5.31	.118
67 7	1892815	59516	137245	9140	26.81	.84	1.94	.129
67 8	1478889	96256	63254	4030	41.79	2.72	1.79	.114
67 9	3263286	96417	72217	4425	64.02	1.89	1.42	.087
67 10	2874942	68892	211032	14634	23.15	.55	1.70	.118
67 10	2874942	68892	211032	14634	23.15	.55	1.70	.118
67 11	427060	51987	20832	5960	12.39	1.51	.60	.173
67 12	1167424	105176	56687	3778	56.89	5.13	2.76	.184
	18464949	894970	970964	57489	41.62	2.02	2.19	.130
68 1	641019	33472	8298	1131	136.73	7.14	1.77	.241
68 2	2045576	122939	35154	3211	108.89	6.54	1.87	.171
68 3	1048755	57292	25919	1861	55.34	3.02	1.37	.098
68 4	134365	61239	6700	1230	168.16	76.64	8.38	1.539
68 5	3247802	109687	104305	5011	45.21	1.53	1.45	.070
68 6	4590726	97241	2045386	24898	17.72	.38	7.90	.096
68 7	1936861	80778	440793	31393	12.86	.54	2.93	.208
68 8	1666052	76569	121880	6163	23.55	1.08	1.72	.087
68 9	1973333	79431	111958	6394	26.24	1.06	1.49	.085
68 10	1204729	67511	720316	15210	9.75	.52	1.72	.113

68 11	5[illegible]1285	49412	25554	5544	13.02	1.23	.64	.139
68 11	[illegible]285	49412	25554	5544	13.02	1.23	.64	.139
68 12	0	0	14614	587	0.00	0.00	2.69	.108
	19010102	835571	3161476	102632	22.50	.99	3.74	.121
69 1	822961	35465	32111	5328	36.73	1.58	1.43	.238
69 2	760055	101107	24616	2527	58.38	7.77	1.89	.194
69 3	2717802	102663	42763	3717	61.07	2.31	.96	.084
69 4	841834	81047	16403	2096	64.13	6.17	1.25	.160
69 5	2371738	84150	69536	3540	44.30	1.57	1.30	.066
69 6	4102763	107749	563478	8827	36.66	.96	5.03	.079
69 7	1379951	76953	168371	12428	24.95	1.39	3.04	.225
69 8	1554336	63925	125619	6130	21.24	.87	1.72	.084
69 9	3912768	92529	113137	6403	48.80	1.15	1.41	.080
69 10	3340126	83693	177904	12209	26.71	.67	1.42	.098
69 11	1063234	71447	51443	13591	11.14	.75	.54	.142
69 12	584615	30459	122457	5355	12.34	.64	2.58	.113
	23452183	931187	1507838	82150	31.90	1.27	2.05	.112
	23452183	931187	1507838	82150	31.90	1.27	2.05	.112
70 1	1091621	119749	34791	7322	27.92	3.06	.89	.187
70 2	1488242	45139	40605	2656	32.14	.97	.88	.057
70 3	2120739	112631	80024	6513	15.26	.81	.58	.047
70 4	205002	21935	21536	2287	4.26	.46	.45	.048
70 5	2156084	50179	47114	3898	79.17	1.84	1.73	.143
70 6	3329219	73675	649774	8864	37.67	.83	7.35	.100
70 7	3103478	84995	202608	14493	44.67	1.22	2.92	.209
70 8	1104673	72363	95331	4946	20.72	1.36	1.79	.093
70 9	2307251	96989	77544	4814	41.88	1.76	1.41	.087
70 10	1201810	70944	93221	7014	22.14	1.31	1.72	.129
70 11	0	0	1702	623	0.00	0.00	.41	.150
70 12	274502	133435	17195	2785	108.49	52.74	6.80	1.101
	18382621	882034	1361443	66213	29.32	1.41	2.17	.106
71 1	1281057	54400	12796	1278	240.98	10.23	2.41	.240
71 1	1281057	54400	12796	1278	240.98	10.23	2.41	.240
71 2	451518	72909	11170	1594	110.54	17.85	2.73	.390
71 3	161269	29627	3821	612	226.48	41.61	5.37	.860
71 4	1461135	123688	20543	2674	278.13	23.54	3.91	.509
71 5	1514933	67698	33201	2061	89.07	3.98	1.95	.121
71 6	4242730	124732	291378	6004	81.84	2.41	5.62	.116
71 7	2379781	77847	159900	11344	41.84	1.37	2.81	.199
71 8	2461913	85951	78405	4420	56.57	1.97	1.80	.102
71 9	3175483	70874	91769	5133	49.69	1.11	1.44	.080
71 10	1635588	92385	60699	4724	40.40	2.28	1.50	.117
71 11	1659970	33850	50287	10566	17.26	.35	.52	.110
71 12	149689	114402	77416	4759	4.83	3.69	2.50	.154
	20575066	948363	891384	55169	49.44	2.28	2.14	.133
72 1	1182963	83222	29644	6000	34.70	2.44	.87	.176
72 2	770995	44997	23676	1833	32.21	1.88	.99	.077
72 2	770995	44997	23676	1833	32.21	1.88	.99	.077
72 3	866435	124951	35444	3146	46.91	6.77	1.92	.170
72 4	855161	89127	42495	3065	17.58	1.83	.87	.063
72 5	2201495	81569	142921	5963	16.92	.63	1.10	.046
72 6	2906343	67126	1375962	16507	17.42	.40	8.25	.099
72 7	1198706	82205	188761	13966	18.04	1.24	2.84	.210
72 8	748807	68028	119586	6011	11.43	1.04	1.83	.092
72 9	508884	59604	61337	3818	13.28	1.56	1.60	.100
72 10	1112995	64654	38652	3221	52.88	3.07	1.84	.153
72 11	486173	70849	21725	5874	15.09	2.20	.67	.182
72 12	154296	78576	50527	3187	8.11	4.13	2.66	.167
	12993253	914908	2130731	72591	19.55	1.38	3.21	.109

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1-32

73	1	2208327	104731	36359	3156	104.60	4.96	1.72	.150
73	2	1395205	53971	17208	1498	109.76	4.25	1.35	.118
73	3	1044621	89234	22383	2260	85.02	7.26	1.82	.184
73	3	1044621	89234	22383	2260	85.02	7.26	1.82	.184
73	4	443341	71916	10367	1571	113.52	18.41	2.65	.402
73	5	1194128	52752	24338	1601	90.52	4.00	1.84	.121
73	6	3542335	131139	393553	7362	60.46	2.24	6.72	.126
73	7	2936261	97384	360443	24980	23.62	.78	2.90	.201
73	8	2691778	91852	162076	7911	28.05	.96	1.69	.082
73	9	2753729	63581	174882	9120	21.78	.50	1.38	.072
73	10	1541913	64312	157718	11254	16.52	.69	1.69	.121
73	11	843778	70477	20626	4765	31.22	2.61	.76	.176
73	12	1186312	83239	74055	4126	38.13	2.68	2.38	.133
		21781728	974588	1454008	79604	35.13	1.57	2.35	.128
74	1	1700590	75310	59280	10677	21.22	.94	.74	.133
74	2	53109	51420	16715	1659	3.21	3.10	1.01	.100
74	3	633541	93109	19156	2153	74.62	10.97	2.26	.254
74	4	437422	36328	6082	787	252.67	20.98	3.51	.454
74	4	437422	36328	6082	787	252.67	20.98	3.51	.454
74	5	1457846	80296	16336	1818	275.08	15.15	3.08	.343
74	6	3821542	99951	277256	5444	83.26	2.18	6.04	.119
74	7	4708238	100152	202721	13789	55.72	1.19	2.40	.163
74	8	1463665	60570	156196	7366	16.81	.70	1.79	.085
74	9	3788195	100258	108494	6309	51.74	1.37	1.48	.086
74	10	659161	34392	127766	8784	8.68	.45	1.68	.116
74	11	1031872	123399	38916	6267	28.37	3.39	1.07	.172
74	12	427793	44863	95756	4447	11.42	1.20	2.56	.119
		20182974	900048	1124674	69498	36.51	1.63	2.03	.126
75	1	0	34398	8504	2154	0.00	3.39	.84	.212
75	2	0	26359	4464	627	0.00	9.29	1.57	.221
75	3	330223	30492	14905	2665	126.04	11.64	5.69	1.017
75	4	53118	48801	5021	972	86.10	79.10	8.14	1.575
75	5	1737935	104409	37948	2887	82.51	4.96	1.80	.137
75	6	0	0	0	0	I	I	I	I
75	6	0	0	0	0	I	I	I	I
75	7	0	0	0	0	I	I	I	I
75	8	0	0	0	0	I	I	I	I
75	9	0	0	0	0	I	I	I	I
75	10	0	0	0	0	I	I	I	I
75	11	0	0	0	0	I	I	I	I
75	12	0	0	0	0	I	I	I	I
		2121276	244459	70842	9306	56.90	6.56	1.90	.250

100

AJYQFGD. 23.53.31. 77/02/15.

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THIS IS D I S P O S E D OUTPUT.

IT WILL NOT HAVE A CARD DECK.

PLEASE PUT OUT FOR USER 9364003

1-33

EXHIBIT 7.5: Discharges, Nutrient Loadings and Concentrations for An Alternate of Backpumping C-51 and L-8 Using 1973-74 Land Uses and Planned Scenario.

L-8 Basin Available Backpumped Quantities and Nutrient Loadings

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/63	None	9388	Same	10800	0	0	0
2		10050	as	10900	0	0	0
3		12309	L-8	10400	1909	7938	280
4		11423	Discharges	10100	1323	5501	194
5		8918		10600	0	0	0
6		12383		9700	2683	12104	438
7		7414		8700	0	0	0
8		7075		9600	0	0	0
9		6514		9400	0	0	0
10		9400		8200	1200	4631	114
11		2291		8900	0	0	0
12/63		3205		10400	0	0	0
1/64	None	17821		9400	8421	35016	1236
2		12783		9200	3583	14899	526
3		7646		10050	0	0	0
4		5867		9600	0	0	0
5		6549		9200	0	0	0
6		9150		9500	0	0	0
7		8707		9400	0	0	0
8		17950		8050	9900	45740	2556
9		19940		8500	11440	44150	1306
10		23700		8500	15200	58660	1446
11		22620		8400	14220	59130	2248
12/64		21836		8600	13236	55038	1943
1/65	36	17574	17610	10200	7410	30812	1087
2	48	12165	12213	10700	1513	6291	222
3	1872	13619	15491	10400	5091	21169	747
4	1770	5821	7591	10200	0	0	0
5	5424	4820	10244	10400	0	0	0
6	8472	8590	17062	10500	6562	29605	1070*
7	5118	9802	14920	8100	6826	26900	557
8	2292	11782	14074	0	14074	65025	3634
9	1938	10802	12720	8200	4520	17440	516
10	0	30382	30382	9100	21283	82136	2025
11	12	27582	27594	7100	20482	85168	3006
12	1926	15656	17582	8200	9382	39012	1377

20 (Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/66	12	19918	19930	10700	9230	38380	1355
2	0	22417	Same	9500	12917	53711	1896
3	0	21031	as	8850	12181	50651	1788
4	0	7613	L-8	9900	2287	9510	336
5	0	10435	Discharges	9700	735	3056	108
6	0	37773		8650	29123	131389	4749
7	0	41427		7000	34627	136457	2823*
8	0	40717		6900	33817	156242	8731
9	0	42982		7500	35402	136625	4041
10	0	26628		6900	9928	38315	944
11	1920	5355	7275	8450	0	0	0
12	0	8795	8795	10300	0	0	0
1/67	1446	8563	10009	10700	0	0	0
2	7776	4903	12679	10100	1979	8229	290
3	6696	6936	13632	10200	3432	14271	504
4	7824	2737	10561	10200	361	1501	53
5	9528	7888	17416	11000	6416	26679	942
6	6966	7367	14333	11200	3133	14135	511
7	1956	13317	15273	8600	6473	25312	523
8	0	12502	12502	0	12502	57762	2088
9	24	7503	7527	8100	0	0	0
10	12	12823	12835	8900	3935	15186	374
11	426	2870	3296	8500	0	0	0
12/67	6606	4735	11341	9900	1441	5992	211
1/68	3834	5820	9654	10600	0	0	0
2	7752	6881	14633	10400	4233	17602	621
3	5520	3423	8943	10400	0	0	0
4	9186	7139	16325	9800	6525	27132	958
5	6840	6450	13290	10300	2990	12433	439
6	0	51447	51447	9100	42583	191049	6905
7	42	48541	48583	0	48583	191455	3961
8	846	14067	14913	0	14913	68901	3850
9	792	10754	11546	8200	3346	12913	382
10	156	33537	33693	9100	24593	94910	2807
11	990	11948	12938	9100	3838	15959	563
12/68	1986	4473	6459	9700	0	0	0*

(Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/69	5448	2085	Calculation	Same	Same	8670	306
2	7194	4514	not	as	as	18770	662
3	3906	20930	necessary	Historical	Histor.	87031	3072
4	5412	4993		Demands	Discharges	20783	734
5	1530	5334				22180	783
6	6882	16431				74129	2679
7	4842	6373				25115	520
8	456	10600				48974	2737
9	1740	10223				39453	1167
10	36	41810				161355	3977
11	36	27106				112712	3978
12/69	36	19228				79954	2822
1/70	2808	14509				60331	2129
2	3978	16467				68473	2417
3	4236	43916				182611	6445
4	282	38541				160261	5656
5	6624	17484				72702	2566
6	0	30914				139469	5041
7	7920	20763				81822	1693
8	7692	25866				119507	6678
9	8886	31595				121933	3606
10	7632	16792				64804	1917
11	7806	607				2524	89
12	11418	1704				7086	250
1/71	8556	1042				4331	153
2	7656	10				42	2
3	9552	5963				24799	875
4	5526	3362				13980	493
5	9654	318				1322	47
6	7194	250				1128	41
7	3720	887				3499	72
8	8124	137				633	35
9	1044	12264				47329	1440
10	7488	819				3261	80
11	5550	4130				17171	606
12/71	6468	845				3514	124

20 (Continued)

Date	Historical M-Canal Demands (Ac-Ft)	Historical L-8 Discharges (Ac-Ft)	Historical L-8 Basin Dis. (Ac-Ft)	Future M-Canal Demands (Ac-Ft)	Future Available L-8 Dis. (Ac-Ft)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
1/72		54	Calculation	Same	Same	225	8
2	7428	238	not	as	as	990	35
3	5894	224	necessary	Histor.	Histor.	931	33
4	7074	932		Demands	L-8	3875	137
5	2160	5617			Discharge	23357	824
6	0	9551				43089	1557
7	2880	6839				26951	558
8	3326	1113				5142	287
9	3168	958				3697	109
10	8772	280				1079	32
11	7554	2				8	0
12/72	7116	58				241	9
1/73	7656	44				181	6
2	4350	0				0	0
3	3114	0				0	0
4	4890	0				0	0
5	8556	0				0	0
6	4794	236				1065	38
7	5034	9578				37745	1425
8	5472	7113				32864	1836
9	1008	7712				29761	880
10	468	5455				21050	519
11	2940	0				0	0
12/73	8160	224				931	33
1/74	6318	1004				4173	147
2	4908	363				1509	53
3	9258	91				379	13
4	7020	0				0	0
5	5088	0				0	0
6	9192	1527				6889	249
7	6972	11903				46907	970
8	7758	10790				49852	2786
9	7494	2123				8191	242
10	7152	5381				20767	512
11	6156	1337				5560	196
12/74	9624	26				108	4

Figure 21 1973-4 Land Uses West Palm Beach Backpumping Alternative West C-51 Plus L-8 Basins.

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/1)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/1)
1/63	3469	8268	0.88	1599	0.170
2	7053	14414	0.75	880	0.046
3	8018	21799	1.00	1263	0.058
4	1870	6096	1.20	253	0.050
5	12599	39971	1.17	1801	0.053
6	9992	108573	4.00	2008	0.074
7	2999	16610	2.04	1023	0.125
8	5496	20100	1.35	1003	0.067
9	25718	101170	1.45	4776	0.068
10	26725	126587	1.74	8374	0.115
11	10034	17751	0.65	4056	0.149
12	8864	38717	1.61	1780	0.074
1/64	22276	59493	0.98	6678	0.110
2	14994	43637	1.07	2023	0.050
3	4350	17814	1.51	940	0.080
4	4709	20184	1.58	946	0.074
5	9804	35045	1.31	1346	0.050
6	19456	189124	3.58	3391	0.064
7	11627	102997	3.26	7120	0.225
8	22773	91773	1.48	4577	0.074
9	34829	141534	1.50	6120	0.065
10	38147	140256	1.35	6217	0.060
11	33410	84889	0.93	9574	0.105
12	24466	131192	1.97	5139	0.077
1/65	11702	40855	1.28	3100	0.097
2	6259	22134	1.30	1028	0.060
3	5091	21169	1.53	747	0.054
4	0	0	-	0	-
5	0	0	-	0	-
6	18522**	88669	1.76	3554	0.071**
7	39145	263053	2.47	16083	0.151
8	33704	163517	1.79	7880	0.086
9	15534	60093	1.42	2597	0.062
10	76340	293362	1.41	15589	0.075
11	63204	132895	0.77	20295	0.118
12/65	15396	85263	2.04	3538	0.085

(Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/66	27339	68634	0.92	6372	0.086
2	32988	92551	1.03	3999	0.045
3	24048	67658	1.04	3382	0.052
4	7097	18709	0.97	809	0.042
5	10755	28068	0.96	1188	0.041
6	65557	718489	4.03	12116	0.068
7	79245**	536380	2.49	30592	0.142**
8	69948	293733	1.55	14592	0.077
9	53305	189971	1.31	6580	0.045
10	34160	144982	1.56	8097	0.087
11	6577	11056	0.62	2884	0.161
12/66	3582	23195	2.38	1049	0.108
1/67	4360	11534	0.97	2036	0.172
2	7366	29742	1.49	1301	0.065
3	4908	21508	1.61	1030	0.077
4	361	1501	1.53	53	0.054
5	6585	33793	1.89	1474	0.082
6	19358	177688	3.38	3692	0.070
7	26855	117412	1.61	6212	0.085
8	23026	107384	1.72	4339	0.069
9	14162	54572	1.42	2563	0.067
10	43991	191587	1.60	12754	0.107
11	11770	17759	0.56	4891	0.153
12/67	7261	43155	2.19	2092	0.106
1/68	1708	6628	1.43	705	0.152
2	8053	43612	1.99	1917	0.088
3	4798	22501	1.73	1032	0.079
4	6608	30658	1.71	1229	0.068
5	23818	86863	1.34	3290	0.051
6	132712	2159063	5.99	29825	0.083
7	100332	611269	2.24	33005	0.121
8	37882	179336	1.74	8599	0.084
9	26971	107724	1.47	5030	0.069
10	69023	297536	1.59	16279	0.087
11	18000	37719	0.77	5376	0.110
12/68	2239**	16369	2.69	657	0.108**

(Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/69	9985	28327	1.04	3415	0.126
2	7856	31102	1.46	1396	0.065
3	33832	110367	1.20	4698	0.051
4	9659	30788	1.17	1531	0.058
5	20823	62875	1.11	2362	0.042
6	47665	399477	3.08	7298	0.056
7	24440	174859	2.63	10974	0.165
8	33569	154609	1.69	7273	0.080
9	35024	127102	1.34	5426	0.057
10	83856	318891	1.40	14202	0.062
11	60444	152451	0.93	15859	0.097
12/69	35080	190077	1.99	7303	0.077
1/70	25989	85270	1.21	6787	0.096
2	31892	104106	1.20	4322	0.050
3	89462	255310	1.05	11236	0.046
4	54871	179205	1.20	7481	0.050
5	24561	109031	1.63	4294	0.064
6	58740	697910	4.37	12062	0.076
7	41712	248487	2.19	12952	0.114
8	43553	204308	1.73	10344	0.087
9	46100	176874	1.41	6258	0.050
10	33971	145045	1.57	7265	0.079
11	2660	4812	0.67	926	0.128
12/70	1898	14065	2.73	771	0.149
1/71	1712	8394	1.80	354	0.076
2	282	4081	5.32	286	0.373
3	5963	24799	1.53	875	0.054
4	3388	14271	1.55	510	0.055
5	3448	22502	2.40	952	0.102
6	11482	123265	3.95	2833	0.091
7	16187	123230	2.80	7866	0.178
8	11982	57561	1.77	2550	0.078
9	31884	121337	1.40	4988	0.058
10	10322	38023	1.36	2145	0.076
11	37897	65412	0.64	10639	0.103
12/71	11006	66683	2.23	2886	0.096

(Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/72	9152	19548	0.79	3689	0.143
2	6857	17797	0.95	985	0.053
3	2971	15860	1.96	749	0.093
4	13013	38781	1.10	1715	0.048
5	48754	156094	1.18	5530	0.042
6	66905	1363338	7.50	16691	0.092
7	28806	200844	2.57	12536	0.160
8	19777	99936	1.86	4392	0.082
9	13224	56240	1.56	2744	0.076
10	6937	34076	1.81	2153	0.114
11	10451	16851	0.59	4372	0.154
12/72	5955	41133	2.54	1807	0.112
1/73	4225	15677	1.37	758	0.066
2	2908	10303	1.30	536	0.068
3	2410	12345	1.88	674	0.103
4	1303	6753	1.91	489	0.138
5	4026	20845	1.91	892	0.082
6	16969	291832	6.33	4725	0.102
7	50570	363053	2.64	23267	0.169
8	36716	168365	1.69	7632	0.076
9	49331	186296	1.39	8465	0.063
10	35305	159030	1.66	9753	0.102
11	9366	15871	0.62	3591	0.141
12/73	9370	54044	2.12	2324	0.091
1/74	29419	51079	0.64	9470	0.118
2	5712	15618	1.01	919	0.059
3	2045	6723	1.21	404	0.073
4	52	314	2.22	22	0.157
5	26	118	1.66	7	0.105
6	12993	145302	4.11	2436	0.069
7	34649	170027	1.81	8894	0.094
8	38658	184326	1.75	8527	0.081
9	23820	89207	1.38	4201	0.065
10	31432	137974	1.62	8334	0.098
11	13014	37660	1.06	4353	0.123
12/74	13153	91919	2.57	3770	0.105

Plan Scenario Land Uses West Palm Beach Backpumping Alternative West C-51 Plus L-8 Basins

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/63	4073	10819	0.98	2578	0.233
2	9990	27152	1.00	2632	0.097
3	9192	27455	1.10	2509	0.100
4	1323	5501	1.53	194	0.054
5	16794	74212	1.63	5026	0.110
6	13629	192409	5.19	4119	0.111
7	4400	29365	2.46	2337	0.195
8	11083	51760	1.72	3547	0.118
9	29603	117218	1.46	6467	0.080
10	30108	142452	1.74	9974	0.121
11	11261	22462	0.73	5375	0.176
12/63	13184	64761	1.81	4854	0.135
1/64	24713	65274	0.97	8240	0.123
2	16980	51491	1.12	3274	0.071
3	6921	23705	1.26	2259	0.120
4	9382	32188	1.26	2766	0.108
5	10440	37641	1.33	2189	0.077
6	25264	312101	4.55	5683	0.083
7	15009	129814	3.18	9757	0.239
8	29082	119764	1.52	6771	0.086
9	39177	159120	1.49	7854	0.074
10	42912	167176	1.43	8785	0.075
11	34904	89412	0.94	11004	0.116
12/64	27050	148741	2.02	6715	0.091
1/65	12251	42889	1.29	4029	0.121
2	7861	30419	1.42	2513	0.118
3	6886	28897	1.54	1874	0.100
4	1934	13886	2.64	1366	0.260
5	233	2250	3.55	282	0.445
6	27773*	156142	2.07	5908	0.078
7	44410	293381	2.43	19230	0.159
8	37180	179332	1.77	9390	0.093
9	19416	76193	1.44	4312	0.102
10	80691	315271	1.44	17733	0.081
11	67360	137639	0.75	21993	0.120
12/65	16804	101721	2.23	6084	0.133

[illegible] (Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/66	31970	94744	1.09	9370	0.108
2	34108	103843	1.12	5217	0.056
3	27164	73564	1.00	4693	0.064
4	10996	34509	1.15	2512	0.084
5	14648	43367	1.09	2748	0.069
6	74105	903926	4.49	15267	0.076
7	85262*	585099	2.52	34796	0.150**
8	75068	316086	1.55	16430	0.081
9	58681	205996	1.29	7944	0.050
10	37005	155798	1.55	9694	0.096
11	8102	16080	0.73	4384	0.199
12/66	5086	35746	2.59	2314	0.167
1/67	4683	15981	1.26	3419	0.269
2	10552	44883	1.57	2899	0.101
3	5826	26417	1.67	2318	0.146
4	361	1501	1.53	53	0.054
5	6416	26679	1.53	942	0.054
6	27040	359049	4.89	8190	0.111
7	32401	162557	1.85	9663	0.110
8	25524	121016	1.74	6118	0.088
9	18755	72217	1.42	4425	0.087
10	49638	226218	1.68	15008	0.111
11	12685	20832	0.60	5960	0.173
12/67	8992	62679	2.56	3989	0.163
1/68	1725	8298	1.77	1131	0.241
2	11145	52756	1.74	3832	0.127
3	6973	25919	1.37	1861	0.098
4	6819	33832	1.83	2188	0.118
5	29420	116738	1.46	5450	0.068
6	137670	2236435	5.98	31803	0.085
7	104003	632248	2.24	35354	0.125
8	40941	190781	1.71	10013	0.090
9	31018	124871	1.48	6776	0.080
10	71975	315826	1.61	18017	0.092
11	18565	41513	0.82	6107	0.121
12/68	1999*	14614	2.69	587	0.108 **

Table 2. (Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/69	10328	40781	1.45	5634	0.201
2	9304	43386	1.72	3189	0.126
3	37305	129794	1.28	6789	0.067
4	9828	37186	1.39	2830	0.106
5	25034	91716	1.35	4323	0.064
6	57611	637607	4.07	11506	0.073
7	26726	193486	2.66	12948	0.178
8	37523	174593	1.71	8867	0.087
9	39723	152590	1.41	7570	0.070
10	87829	339259	1.42	16186	0.068
11	62226	164155	0.97	17569	0.104
12/69	36664	202411	2.03	8177	0.082
1/70	28896	95122	1.21	9451	0.120
2	33505	109078	1.20	5073	0.056
3	95065	262635	1.02	12858	0.050
4	56230	181797	1.19	7943	0.052
5	27505	119816	1.60	6464	0.086
6	63436	789243	4.58	13905	0.081
7	46328	284430	2.26	16186	0.129
8	45486	214838	1.74	11624	0.094
9	51867	199477	1.42	8420	0.060
10	36769	158025	1.58	8931	0.089
11	2134	4226	0.73	712	0.123
12/70	2635	24281	3.39	3035	0.424
1/71	2998	17127	2.10	1431	0.176
2	1513	11212	2.73	1596	0.388
3	6225	28620	1.69	1487	0.088
4	5295	34523	2.40	3167	0.220
5	6576	34523	1.93	2108	0.118
6	19324	292506	5.57	6045	0.115
7	21815	163399	2.76	11416	0.193
8	16151	79038	1.80	4455	0.101
9	35779	139098	1.43	6533	0.067
10	15716	63960	1.50	4804	0.112
11	39512	67458	0.63	11172	0.104
12/71	12246	80930	2.43	4883	0.147

(Continued)

Date	Discharge (Ac-Ft)	TOTAL NITROGEN Loading (lbs)	TOTAL NITROGEN Concentrations (mg/l)	TOTAL PHOSPHORUS Loading (lbs)	TOTAL PHOSPHORUS Concentrations (mg/l)
1/72	12599	29869	0.87	6008	0.175
2	9045	24666	1.00	1868	0.076
3	7034	36375	1.90	3179	0.166
4	18833	46370	0.91	3202	0.063
5	53486	166278	1.14	6787	0.047
6	70953	1419051	7.36	18064	0.094
7	31294	215712	2.54	14524	0.171
8	25217	124728	1.82	6298	0.092
9	15060	65034	1.59	3927	0.096
10	8050	39731	1.82	3253	0.149
11	11853	21733	0.67	5874	0.182
12/72	7060	50768	2.65	3428	0.179
1/73	7812	36540	1.72	3162	0.149
2	4677	17208	1.35	1498	0.118
3	4521	22383	1.82	2260	0.184
4	1437	10367	2.65	1571	0.402
5	4854	24338	1.84	1601	0.121
6	21794	394618	6.66	7400	0.125
7	55325	398188	2.65	26405	0.176
8	42418	194940	1.69	9747	0.085
9	54239	204643	1.39	10000	0.068
10	39804	178768	1.65	11773	0.109
11	9943	20626	0.76	4765	0.176
12/73	11672	74986	2.36	4159	0.131
1/74	30489	63453	0.77	10824	0.131
2	6460	18224	1.04	1712	0.098
3	3215	19535	2.24	2166	0.248
4	637	6082	3.51	787	0.455
5	1950	16336	3.08	1818	0.343
6	18416	284145	5.68	5693	0.114
7	42994	249628	2.14	14759	0.126
8	42834	206048	1.77	10152	0.087
9	29062	116685	1.48	6551	0.083
10	33336	148533	1.64	9296	0.103
11	14721	33376	1.11	6463	0.162
12/74	13814	95864	2.55	4451	0.119

Exhibit 7.6: Input Set For C-4 Basin

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H2  .156     .129    .082
J1 3.483    .3483   .0218    .0254.0001052
T1     0
T2   0.0       1                     2
T3.00001

A1                  WEST TAMIAMI(C-4) PATTERN SCENARIO
A2        JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3        SCENARIO LAND USE- URBAN,            BOD,N,P, -  CIMP=0.658
B1     1       0       1       0       1       0
B2    10       1       1  621109      13
C1 MIAMI WSO AP                       11            630101  750531         1
E1 C-4WEST             5     4.6 .000001
E224870.     .10    .658      1.       0
E3    .1    .104    .048    .078    .169    .182    .213    .216    .219    .200
E3  .156    .129    .082
F1SINGLE   73.73     35.    100.    9999
F2   10. .000001 .000001   0.446   .0562 .001249
F1MULTPL    4.11     65.    100.    9999
F2   10. .000001 .000001   1.055   .2341 .004088
F1COMMCL    5.49     85.    100.    9999
F2   10. .000001 .000001   4.478   .3122  .01137
F1INDSTL   13.90     61.    100.    9999
F2   10. .000001 .000001   1.758   .4948 .007353
F1OPEN      2.77      5.    100.    9999
#1OPEN      2.77      5.    100.    9999
F2   10. .000001 .000001    .122   .0758.0002604
H1.00001     .10      1.       0                           .46
H2     3    .104    .048    .078    .169    .182    .213    .216    .219    .200
H2  .156    .129    .082
J1 3.483   .3483   .0218   .0254.0001052
T1     0
T2   0.0       1                     2
T3.00001

C-4WEST        237.     100.     177.     373.     415.     470.     493.
C-4WEST        499.     442.     355.     285.     187.          SWETH
C-4WEST        418.     176.     312.     657.     729.     826.     868.
C-4WEST        878.     777.     625.     502.     329.          SWETF
   .145
C-4WEST 63    7395.   11352.    8977.    3342.    3866.   12117.    3991.
C-4WEST 63    5522.   15955.   19458.    6643.    5465.          DISH
C-4WEST 64    8545.    4824.    3852.    3362.    1734.   11631.   11486.
C-4WEST 64    9666.    7498.   10146.    9545.   12141.          DISH
C-4WEST 65    8216.   14450.   13309.    5355.    3422.    4229.    8309.
C-4WEST 65    4249.    8265.   17217.   14874.    9588.          DISH
C-4WEST 66   12181.    8725.    9198     7367.    7531.   17693.   19101.
#-4WEST 66   12181.    8725.    9198.    7367.    7531    17693.   19101.
C-4WEST 66   15743.   18697.   18345.   13732.    8934.          DISH
C-4WEST 67    8249.    7242.    6312.    4939.    2840.   11742.   13046.
C-4WEST 67    8926.    6145.   12476.    8420.    6653.          DISH
C-4WEST 68   14051.   13688.   11437.    6442    24691.   46761.   39113.
C-4WEST 68   27829.   32577.   43560.   25103.   17239.          DISH
C-4WEST 69   21166.   14837.   11978.   12137.   22864.   44260.   27686.
C-4WEST 69   30843.   25849.   31742.   33831.   21323.          DISH
C-4WEST 70   18651.   14706.   13843.   14813.   17911.   29060.   22967.
C-4WEST 70   22834.   32139.   25754.   17191.   13528.          DISH
C-4WEST 71   11742.    8057.    6990.    3054.    4473.   10707.    9398.
C-4WEST 71   11351.   29574.   25001.   20053.   23495.          DISH
C-4WEST 72   11016.    9765.    2057.    9323.   23497.   22350.   20864.
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C-4WEST 72     28866.     25482.     17530.     25068.     13633.                DISH
C-4WEST 73     12492.      9674.      8011.      4996.      3848.      5836.      18211.
C-4WEST 73     12492.      9674.      8011.      4996.      3848.      5836.      18211.
C-4WEST 73     25813.     31276.     20494.     13520.     11941.                DISH
C-4WEST 74     11935.      8291.      5639.      5996.      4965.      5740.      14464.
C-4WEST 74     22120.     18332.     18766.     14339.     15840.                DISH
C-4WEST 75      8150.      5890.      4920.      6217.      7060.        0.          0.
C-4WEST 75         0.         0.         0.         0.         0.                DISH

C-4WEST
C-4WEST                                                                       ONPSCSS
C-4WEST
C-4WEST                                                                       ONPSCBOD
C-4WEST         1.33       1.30       1.08       1.10       1.22       0.96        1.91
C-4WEST         2.05       1.37       1.78       1.94       1.16                ONPSCN
C-4WEST         .016       .084       .080       .007       .009       .034        .012
C-4WEST         .014       .014       .021       .008       .001                ONPSCP
C-4WEST           .0         .0       .147       .147                            REFF


        AJYQJYE.   77/02/19.FLORIDA STATE UNIVERSITY KRONOS


16.12.10.JGF,T550,CM120000,MO    FOY
16.12.11.ACCOUNT,9364003,.
16.12.11.STAGEI,RI1098,7782/+2.TAPE11.
16.14.18.MT51, ASSIGNED TO STAGEIN, VSN=****51.
16.14.24. STAGING COMPLETE.
16.14.24.CALL,PROG3.
16.14.24.CALL,PROG3.
16.14.25.CBR,,CARDS.
16.14.25. COPY COMPLETE.
16.14.25.CBR,,CARD2.
16.14.25. COPY COMPLETE.
16.14.25.CBR,,IP1.
16.14.25. COPY COMPLETE.
16.14.26.CBR,,IP2.
16.14.26. COPY COMPLETE.
16.14.26.CBR,,IP3.
16.14.26. COPY COMPLETE.
16.14.26.G,STORM,SUMMB.
16.14.28.CALL (PROG2(LFN=LAND,NAME=IP1)
16.14.28.RA,INPUT.
16.14.28.ASSIGN.MS.OUTPUT.
16.14.28.DI00, ASSIGNED TO OUTPUT.
16.14.29.STORM(IP1)
16.16.17.STOP
16.16.17.RENAME,QUAL=TAPE13.
16.16.17.RENAME,OUT=OUTPUT.
16.16.17.RA,INPUT.
16.16.17.SUMMB.
16.17.15.STOP
16.17.15.RENAME,LAND=QUALSUM.
16.17.15.DISPOSE,QUAL=PR/EI=9364003.
16.17.15.RT,OUT.
16.17.15.CALL (PROG2(LFN=SCENAR,NAME=IP2)
16.17.16.RA,INPUT.
16.17.16.ASSIGN.MS.OUTPUT.
16.17.16.DI00, ASSIGNED TO OUTPUT
```

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Exhibit 7.7: CLADM Hydrologic Output for Western C-4 Using 1973-74 Land Uses and Planned Scenario.

WEST TAMIAMI

	73-74 LAND USES						*	SCENARIO LAND USES				
	RAINFALL	DISCHARGE	RUNOFF	SWET	DSET	NGWL	NGWL	RUNOFF	DSET	SWET	DISCHARGE
63 1	2169	7395	100	237	1615	-7078	-8104	167	1487	418	8368
■3 1	2169	7395	100	237	1615	-7078	-8104	167	1487	418	8368
63 2	11515	11352	1669	100	2279	-2216	-2537	2370	1831	176	12045
63 3	2436	8977	234	177	1143	-7861	-9001	367	936	312	10189
63 4	1101	3342	33	373	917	-3531	-4043	67	829	657	3658
63 5	21160	3866	3104	415	3982	12897	11264	4272	3702	729	5465
63 6	22696	12117	2837	470	6995	3114	2720	4005	6328	826	12822
63 7	5908	3991	501	493	3137	-1713	-1961	734	2907	868	4094
63 8	15920	5522	1969	499	5022	4877	4259	2737	4736	878	6047
63 9	37114	15955	5574	442	6267	14450	12620	7643	5880	777	17837
63 10	14785	19458	1969	355	3888	-8916	-10209	2770	3465	625	20904
63 11	4773	6643	501	285	2002	-4157	-4760	701	1908	502	7123
63 12	14218	5465	2236	187	1842	6724	5872	3104	1533	329	6484
	153795	104083	20727	4033	39089	6590	-3880	28937	35542	7097	115036
■	153795	104083	20727	4033	39089	6590	-3880	28937	35542	7097	115036
64 1	1502	8545	167	237	578	-7858	-8997	234	547	418	9534
64 2	7376	4824	968	100	2019	433	378	1368	1784	176	5038
64 3	1669	3852	100	177	1115	-3475	-3979	167	987	312	4349
64 4	11047	3362	1469	373	2920	4392	3836	2003	2864	657	3690
64 5	15587	1734	2136	415	3765	9673	8448	2937	3584	729	2826
64 6	34978	11631	5173	470	6348	16529	14436	7009	6335	826	13381
64 7	18390	11486	2103	493	6753	-342	-392	3004	6115	868	11799
64 8	32842	9666	5040	499	4950	17727	15482	6875	4745	878	11737
64 9	14085	7498	1669	442	4849	1296	1132	2403	4264	777	7912
64 10	32608	10146	5073	355	4532	17575	15349	6976	4102	625	12532
64 11	10013	9545	1335	285	2624	-2441	-2795	1902	2238	502	10068
64 12	20827	12141	3504	187	1432	7067	6172	4806	1186	329	13140
■4 12	20827	12141	3504	187	1432	7067	6172	4806	1186	329	13140
	200924	94430	28737	4033	41885	60576	49070	39684	38751	7097	106006
65 1	6608	8216	634	237	3099	-4944	-5661	968	2653	418	9198
65 2	9946	14450	1402	100	2188	-6792	-7777	1936	2035	176	15512
65 3	13250	13309	2003	177	2168	-2404	-2753	2804	1793	312	13898
65 4	4005	5355	567	373	865	-2588	-2963	768	868	657	5443
65 5	1469	3422	67	415	1099	-3467	-3970	167	787	729	3923
65 6	21861	4229	2970	470	5422	11740	10253	4205	4676	826	6106
65 7	21895	8309	2770	493	6564	6529	5702	3905	5936	868	9389
65 8	16588	4249	2003	499	5505	6335	5533	2904	4722	878	5455
65 9	37982	8265	5607	442	6950	22325	19498	7877	5793	777	11914
65 10	56038	17217	9245	355	4873	33593	29339	12683	4208	625	21866
65 11	3204	14874	200	285	2096	-14051	-16088	334	1840	502	16950
■5 11	3204	14874	200	285	2096	-14051	-16088	334	1840	502	16950
65 12	2069	9588	167	187	1146	-8852	-10136	267	978	329	10898
	194915	111483	27635	4033	41975	37424	20978	38818	36289	7097	130551
66 1	13250	12181	1802	237	3276	-2444	-2798	2470	3157	418	12473
66 2	21895	8725	3771	100	1022	12048	10522	5173	754	176	10443
66 3	10847	9198	1602	177	1981	-509	-583	2236	1709	312	9409
66 4	6008	7367	801	373	1575	-3307	-3787	1168	1234	657	7904
66 5	18457	7531	2637	415	3865	6646	5804	3638	3590	729	8334
66 6	71324	17693	11214	470	9261	43900	38341	15320	8719	826	23438

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MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM
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WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM

                                  TAMIAMI CANAL BASIN
A1
A2          JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3                     73-74 LAND USES   WEST TAMIAMI
#3                     73-74 LAND USES   WEST TAMIAMI
B1      1        0        1       0       1       0
B2     10        1        1  621109      13
C1 MIAMI WSO AP                          11              630101  750531         1
E1 C-4WEST                5     4.6 .000001
E213843.     .10         .9      1.       0
E3   .10    .104       .048    .078    .169    .182    .213    .216    .219    .200
E3  .156    .129       .082
F1SINGLE   55.75        34.    100. 9999999
F2   10. .000001 .000001    0.446   .0562  .001249
F1MULTPL    6.17       79.6    100. 9999999
F2   10. .000001 .000001    1.055   .2341  .004088
F1COMMCL    1.03        85.    100. 9999999
F2   10. .000001 .000001    4.478   .3122   .01137
F1INDSTL   10.05      30.75    100. 9999999
F2   10. .000001 .000001    1.758   .4948  .007353
F1OPEN     27.00         5.    100. 9999999
F2   10. .000001 .000001     .122   .0758.0002604
H126208.     .10        1.0                                     .46
H2   .24    .104       .048    .078    .169    .182    .213    .216    .219    .200
H2  .156    .129       .082
J1 1.993   .1993      .0244   .0168.0000774
T1      0
T2   0.0       1                      2
T3.00001
#3.00001

A1                        WEST TAMIAMI(C-4) PATTERN SCENARIO
A2          JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3          SCENARIO LAND USE-                    BOD,N,P, -  CIMP=0.658
B1      1        0        1       0       1       0
B2     10        1        1  621109      13
C1 MIAMI WSO AP                          11              630101  750531         1
E1 C-4WEST                5     4.6 .000001
E224870      .10       .658      1.       0
E3     1    .104       .048    .078    .169    .182    .213    .216    .219    .200
E3  .156    .129       .082
F1SINGLE   73.73        35.    100.    9999
F2   10. .000001 .000001    0.446   .0562  .001249
F1MULTPL    4.11        65.    100.    9999
F2   10. .000001 .000001    1.055   .2341  .004088
F1COMMCL    5.49        85.    100     9999
F2   10. .000001 .000001    4.478   .3122   .01137
F1INDSTL   13.90        61.    100.    9999
F2   10. .000001 .000001    1.758   .4948  .007353
F1OPEN      2.77         5.    100.    9999
F2   10  .000001 .000001     122    .0758.0002604
H115181.     .10         1.       0                             .46
H2    .3    .104       .048    .078    .169    .182    .213    .216    .219    .200
#2    .3    .104       .048    .078    .169    .182    .213    .216    .219    .200
```

66	7	28369	19101	3671	493	8051	724	632	5173	7228	868	19641
66	8	25432	15743	3404	499	6592	2598	2269	4806	5792	878	16493
66	9	26701	18697	3471	442	7491	71	62	4839	6924	777	18938
66	10	36313	18345	5674	355	4912	12701	11093	7877	4124	625	20471
66	10	36313	18345	5674	355	4912	12701	11093	7877	4124	625	20471
66	11	12816	13732	1802	285	2842	-4043	-4629	2470	2723	502	14220
66	12	2470	8934	234	187	1177	-7828	-8963	334	1106	329	9998
		273882	157247	40083	4033	52045	60557	47963	55504	47060	7097	171762
67	1	9178	8249	1135	237	2898	-2206	-2526	1602	2631	418	8655
67	2	3805	7242	334	100	1958	-5495	-6292	501	1759	176	8162
67	3	12015	6312	1635	177	2964	2562	2238	2336	2468	312	6997
67	4	501	4939	33	373	316	-5127	-5870	33	364	657	5350
67	5	5607	2840	768	415	1359	993	867	1068	1243	729	2768
67	6	53335	11742	8077	470	8634	32489	28375	11047	8188	826	15946
67	7	18524	13046	2503	493	4670	315	275	3471	4339	868	13042
67	8	27135	8926	3538	499	7555	10155	8869	5006	6675	878	10713
67	9	30639	6145	4572	442	5334	18718	16348	6341	4724	777	8790
67	9	30639	6145	4572	442	5334	18718	16348	6341	4724	777	8790
67	10	42988	12476	6775	355	5492	24665	21541	9278	5071	625	15751
67	11	12716	8420	1736	285	3111	900	786	2436	2759	502	8669
67	12	4572	6653	601	187	1248	-3516	-4026	834	1163	329	7106
		221015	96990	31707	4033	45539	74453	60585	43953	41384	7097	111949
68	1	6408	14051	768	237	2160	-10040	-11496	1101	1907	418	15579
68	2	9245	13688	1235	100	2411	-6954	-7962	1769	2016	176	15015
68	3	2937	11437	267	177	1459	-10136	-11606	367	1437	312	12794
68	4	4239	6442	567	373	1099	-3675	-4208	834	829	657	6961
68	5	61879	24691	9712	415	8128	28645	25017	13183	8003	729	28130
68	6	74628	46761	11815	470	9241	18156	15857	16121	8750	826	49195
68	7	20526	39113	2603	493	6119	-25199	-28853	3605	5796	868	42715
68	8	27835	27829	3972	499	5855	-6348	-7268	5641	4785	878	29440
68	8	27835	27829	3972	499	5855	-6348	-7268	5641	4785	878	29440
68	9	37081	32577	5841	442	4756	-694	-795	8110	3937	777	33162
68	10	29070	43560	4038	355	6720	-21565	-24692	5540	6429	625	46708
68	11	4038	25103	434	285	1637	-22987	-26320	567	1720	502	28136
68	12	434	17239	0	187	434	-17426	-19953	33	297	329	19761
		278320	302491	41252	4033	50019	-78223	-102278	56871	45906	7097	327595
69	1	22228	21166	3438	237	3203	-2378	-2723	4739	2860	418	21673
69	2	6742	14837	1135	100	462	-8657	-9912	1535	468	176	16010
69	3	6608	11978	734	177	2545	-8092	-9265	1068	2244	312	13317
69	4	15453	12137	2136	373	3631	-688	-788	3004	3178	657	12406
69	5	26767	22864	3872	415	5341	-1853	-2122	5307	5081	729	23079
69	6	38115	44260	5474	470	7823	-14438	-16532	7476	7563	826	46258
69	7	28303	27686	3738	493	7615	-7491	-8577	5240	6889	868	29123
69	7	28303	27686	3738	493	7615	-7491	-8577	5240	6889	868	29123
69	8	14385	30843	1535	499	5888	-22845	-26158	2270	5110	878	34555
69	9	27502	25849	3872	442	6075	-4864	-5569	5273	5951	777	26343
69	10	45291	31742	7142	355	5763	7431	6490	9812	5191	625	32985
69	11	3371	33831	167	285	2447	-33192	-38005	300	2143	502	38731
69	12	3838	21323	567	187	698	-18370	-21034	768	701	329	23842
		238603	298516	33810	4033	51491	-115437	-134194	46792	47379	7097	318321
70	1	8811	18651	1101	237	2716	-12793	-14648	1635	2128	418	20913
70	2	5908	14706	801	100	1474	-10372	-11876	1101	1407	176	16201
70	3	8711	13843	1101	177	2616	-7925	-9074	1635	2028	312	15445
70	4	3171	14813	467	373	585	-12600	-14427	634	579	657	16362
70	5	36647	17911	5941	415	3768	14553	12710	8177	3230	729	19978
70	6	18457	29060	2436	470	4973	-16046	-18373	3471	4272	826	31732

70	6	18457	29060	2436	470	4973	-16046	-18373	3471	4272	826	31732
70	7	14952	22967	1702	493	5532	-14040	-16076	2370	5268	868	24892
70	8	12015	22834	1402	499	4257	-15575	-17833	2069	3559	878	25411
70	9	29671	32139	4072	442	7136	-10046	-11503	5674	6484	777	33913
70	10	10046	25754	868	355	5244	-21307	-24397	1302	4727	625	29091
70	11	300	17191	0	285	0	-17176	-19667	0	0	502	19465
70	12	567	13528	0	187	567	-13715	-15704	0	567	329	15375
		149256	243397	19891	4033	38868	-137042	-160866	28068	34249	7097	268776
71	1	1702	11742	200	237	594	-10871	-12447	267	611	418	13120
71	2	2670	8057	267	100	1192	-6679	-7647	367	1170	176	8971
71	3	1335	6990	33	177	1150	-6982	-7994	67	1062	312	7955
71	4	234	3854	0	373	0	-3993	-4572	0	0	657	4149
71	5	13784	4473	1936	415	3071	5825	5087	2770	2464	729	5504
71	5	13784	4473	1936	415	3071	5825	5087	2770	2464	729	5504
71	6	38883	10707	5741	470	7112	20594	17986	8010	6148	826	13923
71	7	15753	9398	1936	493	5040	822	718	2670	4842	868	9325
71	8	20092	11951	2270	499	7532	110	96	3271	6726	878	12392
71	9	32141	29574	4406	442	7759	-5634	-6451	6141	7044	777	30771
71	10	24965	25801	3371	355	6309	-7500	-8587	4773	5461	625	27466
71	11	3271	20053	100	285	2717	-19784	-22653	234	2316	502	23106
71	12	14452	23495	2303	187	1707	-10937	-12523	3137	1631	329	25015
		169282	166095	22563	4033	44183	-45029	-58988	31707	39475	7097	181698
72	1	5340	11016	567	237	2200	-8113	-9289	768	2203	418	12008
72	2	9045	9765	1235	100	2211	-3031	-3470	1736	1952	176	10387
72	3	10046	9057	1936	177	-667	1479	1292	2670	-865	312	9307
72	4	8911	9323	567	373	5771	-6556	-7507	868	5365	657	10396
72	4	8911	9323	567	373	5771	-6556	-7507	868	5365	657	10396
72	5	45758	23497	7042	415	6784	15062	13155	9746	5931	729	25943
72	6	36380	22350	5273	470	7195	6365	5559	7343	6373	826	23622
72	7	23797	20864	3171	493	6249	-3809	-4361	4472	5520	868	21770
72	8	21661	28866	2804	499	6145	-13849	-15857	4005	5294	878	31346
72	9	16955	25482	2003	442	5872	-14841	-16993	2837	5361	777	27810
72	10	9545	17530	935	355	4374	-12714	-14558	1302	4226	625	19252
72	11	9245	25068	1101	285	3150	-19258	-22050	1569	2835	502	27958
72	12	13951	13633	1936	187	3238	-3107	-3558	2737	2767	329	14413
		210634	216451	28570	4033	52522	-62372	-77638	40053	46962	7097	234213
73	1	11381	12492	1702	237	1961	-3309	-3789	2303	1970	418	12782
73	2	7376	9674	868	100	2574	-4972	-5693	1235	2329	176	10564
73	3	5874	8011	734	177	1810	-4124	-4722	1035	1646	312	8638
73	3	5874	8011	734	177	1810	-4124	-4722	1035	1646	312	8638
73	4	7476	4996	1168	373	1011	1096	957	1569	1066	657	4796
73	5	3605	3848	167	415	2681	-3339	-3823	267	2513	729	4186
73	6	29805	5836	4005	470	7639	15860	13852	5607	6890	826	8237
73	7	20493	18211	2637	493	5901	-4112	-4708	3705	5353	868	18980
73	8	48795	25813	6942	499	10375	12108	10575	9545	9787	878	27555
73	9	21995	31276	2637	442	7402	-17125	-19608	3605	7264	777	33562
73	10	11214	20494	1068	355	5304	-14939	-17105	1569	4804	625	22890
73	11	1535	13520	67	285	1166	-13436	-15384	134	990	502	15427
73	12	8210	11941	1168	187	1746	-5664	-6485	1669	1391	329	12975
		177759	166112	23163	4033	49570	-41956	-55934	32243	46003	7097	180593
74	1	8477	11935	1168	237	2013	-5708	-6536	1602	1931	418	12664
74	2	334	8291	0	100	0	-8057	-9225	0	0	176	9383
74	2	334	8291	0	100	0	-8057	-9225	0	0	176	9383
74	3	7576	5639	1135	177	1296	464	405	1535	1302	312	5557
74	4	7042	5996	935	373	1870	-1197	-1371	1302	1723	657	6033
74	5	8778	4965	868	415	3975	-577	-661	1202	3868	729	4842

74	6	27101	5740	3705	470	6598	14293	12483	5173	5960	826	7832
74	7	20326	14464	2136	493	8504	-3135	-3590	3071	7778	868	15270
74	8	31006	22120	4372	499	6809	1578	1378	6074	6182	878	22568
74	9	21294	18332	2436	442	7810	-5290	-6057	3538	6836	777	19738
74	10	12282	18766	1569	355	3601	-10440	-11954	2203	3280	625	20331
74	11	15420	14339	2370	285	2305	-1509	-1728	3237	2189	502	14457
74	12	3905	15840	534	187	950	-13072	-14967	734	904	329	17639
		163541	146427	21228	4033	45731	-32650	-41821	29671	41953	7097	156312
75	1	4639	8150	467	237	2053	-5801	-6642	634	2048	418	8815
■5	1	4639	8150	467	237	2053	-5801	-6642	634	2048	418	8815
75	2	3004	5890	267	100	1526	-4512	-5166	401	1367	176	6627
75	3	2036	4920	167	177	1112	-4173	-4778	267	945	312	5557
75	4	1769	6217	134	373	1030	-5851	-6699	167	1087	657	6724
75	5	16488	7060	1802	415	6513	2500	2183	2670	5576	729	8000
75	6	0	0	0	470	0	-470	-538	0	0	826	0
75	7	0	0	0	493	0	-493	-564	0	0	868	0
75	8	0	0	0	499	0	-499	-571	0	0	878	0
75	9	0	0	0	442	0	-442	-506	0	0	777	0
75	10	0	0	0	355	0	-355	-406	0	0	625	0
75	11	0	0	0	285	0	-285	-326	0	0	502	0
75	12	0	0	0	187	0	-187	-214	0	0	329	0
		27936	32237	2837	4033	12234	-20568	-24229	4139	11023	7097	35723

AJYQJYE. 16.24.05. 77/02/19.

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Exhibit 7.8: CLADM Quality Output for Western C-4 Using 1973-74 Land Uses.

WEST TAMIAMI CANAL BASIN
1973-4 LAND USES

		TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TCN	TCP
63	1	0	32583	33188	424	0.00	1.62	1.65	.021
63	2	33497	48462	44550	2371	1.09	1.57	1.44	.077
63	3	35811	24565	31013	1981	1.47	1.01	1.27	.081
63	3	35811	24565	31013	1981	1.47	1.01	1.27	.081
63	4	2803	2407	10412	71	.31	.27	1.15	.008
63	5	593141	55881	17701	202	56.45	5.32	1.68	.019
63	6	599911	28246	33645	951	18.22	.86	1.02	.029
63	7	105080	18324	22567	174	9.69	1.69	2.08	.016
63	8	552662	31770	29686	238	36.83	2.12	1.98	.016
63	9	1441254	41818	55861	529	33.24	.96	1.29	.012
63	10	385808	20096	91076	1064	7.30	.38	1.72	.020
63	11	82037	20225	37098	200	4.54	1.12	2.05	.011
63	12	472554	43205	21994	151	31.82	2.91	1.48	.010
		4304558	367582	428792	8354	15.22	1.30	1.52	.030
64	1	29326	7491	32024	389	1.26	.32	1.38	.017
64	2	245415	37571	22926	1004	18.72	2.87	1.75	.077
64	3	20875	13190	13896	859	1.99	1.26	1.33	.082
64	4	460749	43788	17527	179	50.43	4.79	1.92	.020
64	5	524300	23355	7964	75	111.25	4.96	1.69	.016
64	5	524300	23355	7964	75	111.25	4.96	1.69	.016
64	6	1499631	39838	33984	725	47.44	1.26	1.08	.023
64	7	480542	29658	57734	404	15.39	.95	1.85	.013
64	8	1147281	35999	40040	293	43.67	1.37	1.52	.011
64	9	339410	22262	28354	296	16.66	1.09	1.39	.015
64	10	980538	40447	38759	422	35.56	1.47	1.41	.015
64	11	218308	26336	50080	265	8.42	1.02	1.93	.010
64	12	728577	23866	36499	100	22.08	.72	1.11	.003
		6674952	343801	379787	5011	26.01	1.34	1.48	.020
65	1	151562	34662	35551	444	6.79	1.55	1.59	.020
65	2	392935	23148	53250	3054	10.01	.59	1.36	.078
65	3	626295	35086	44203	2572	17.31	.97	1.22	.071
65	4	180259	23061	20198	167	12.39	1.58	1.39	.011
65	5	0	13440	13937	126	0.00	1.45	1.50	.014
65	6	885827	43755	17640	258	77.07	3.81	1.53	.022
65	7	791159	34700	40658	292	35.03	1.54	1.80	.013
65	7	791159	34700	40658	292	35.03	1.54	1.80	.013
65	8	519233	25736	20944	169	44.96	2.23	1.81	.015
65	9	1434571	40593	26809	232	63.87	1.81	1.19	.010
65	10	2024410	50307	60973	619	43.26	1.08	1.30	.013
65	11	23794	13369	80307	362	.59	.33	1.99	.009
65	12	31183	19413	33947	90	1.20	.74	1.30	.003
		7061228	357270	448417	8385	23.31	1.18	1.48	.028
66	1	446614	41493	48820	587	13.49	1.25	1.47	.018
66	2	192425	33216	31451	1238	8.11	1.40	1.33	.052
66	3	426877	31927	31483	1756	17.08	1.28	1.26	.070
66	4	232246	13127	23738	168	11.60	.66	1.19	.008
66	5	822328	43801	30218	263	40.18	2.14	1.49	.013

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66	6	1541336	54409	43202	774	32.05	1.13	.90	.016
66	7	568046	29398	89580	597	10.94	.57	1.73	.012
66	8	530676	24799	77048	551	12.40	.58	1.80	.013
66	9	771601	32471	68014	685	15.18	.64	1.34	.013
■6	9	771601	32471	68014	685	15.18	.64	1.34	.013
66	10	1206026	33570	75399	829	24.19	.67	1.51	.017
66	11	306930	22776	69468	334	8.22	.61	1.86	.009
66	12	29609	16374	31029	78	1.22	.67	1.28	.003
		7074714	377361	619450	7860	16.55	.88	1.45	.018
67	1	173059	38610	34811	436	7.72	1.72	1.55	.019
67	2	45872	16136	28053	1631	2.33	.82	1.43	.083
67	3	333346	37801	23594	1142	19.43	2.20	1.38	.067
67	4	0	2770	15247	102	0.00	.21	1.14	.008
67	5	142502	39283	15927	180	18.46	5.09	2.06	.023
67	6	1502621	46382	28085	489	47.09	1.45	.88	.015
67	7	341158	21066	61138	413	9.62	.59	1.72	.012
67	8	494863	35958	40449	322	20.40	1.48	1.67	.013
67	9	675598	30199	16141	159	40.45	1.81	.97	.010
67	10	880840	27760	38557	417	25.98	.82	1.14	.012
67	11	213308	22836	41272	220	9.32	1.00	1.80	.010
■7	11	213308	22836	41272	220	9.32	1.00	1.80	.010
67	12	81128	26754	25155	104	4.49	1.48	1.39	.006
		4884295	345555	368429	5616	18.53	1.31	1.40	.021
68	1	140720	22508	53549	653	3.68	.59	1.40	.017
68	2	291453	31012	52198	2945	7.83	.83	1.40	.079
68	3	40571	14123	35980	2475	1.31	.45	1.16	.080
68	4	169111	38056	26521	237	9.66	2.17	1.51	.014
68	5	2660789	53730	76523	539	39.65	.80	1.14	.008
68	6	1977445	44210	112033	3375	15.56	.35	.88	.027
68	7	324655	21150	195853	1259	3.05	.20	1.84	.012
68	8	674063	32231	143620	1014	8.91	.43	1.90	.013
68	9	1127796	39916	114520	1147	12.74	.45	1.29	.013
68	10	779341	27297	201481	2345	6.58	.23	1.70	.020
68	11	64033	10643	132670	571	.94	.16	1.94	.008
68	12	0	2855	54946	56	0.00	.06	1.17	.001
		8249977	337731	1199893	16615	10.04	.41	1.46	.020
■		8249977	337731	1199893	16615	10.04	.41	1.46	.020
69	1	918532	69415	83996	998	15.97	1.21	1.46	.017
69	2	356993	19514	54590	3192	8.85	.48	1.35	.079
69	3	203959	31735	40841	2549	6.27	.97	1.25	.078
69	4	620970	32697	40385	297	18.83	.99	1.22	.009
69	5	1113178	36019	77042	583	17.91	.58	1.24	.009
69	6	1268882	36922	116367	3703	10.55	.31	.97	.031
69	7	756941	31840	135418	885	10.06	.42	1.80	.012
69	8	270005	21558	169383	1184	3.22	.26	2.02	.014
69	9	788865	36098	94012	953	11.23	.51	1.34	.014
69	10	1624956	42899	137519	1543	18.84	.50	1.59	.018
69	11	3681	15540	180766	783	.04	.17	1.97	.009
69	12	121063	16805	69663	111	2.09	.29	1.20	.002
		8048025	391042	1199983	16781	9.92	.48	1.48	.021
70	1	315679	40773	73821	897	6.23	.80	1.46	.018
70	2	240913	17508	54206	3231	6.03	.44	1.36	.081

■0	2	240913	17508	54206	3231	6.03	.44	1.36	.081
70	3	351780	31734	46106	2874	9.35	.84	1.23	.076
70	4	144769	10949	46029	309	3.60	.27	1.14	.008
70	5	1665693	63623	62777	501	34.22	1.31	1.29	.010
70	6	576984	24775	78034	2540	7.31	.31	99	.032
70	7	410115	31902	119467	797	6.57	.51	1.91	.013
70	8	384092	27031	127317	903	6.19	.44	2.05	.015
70	9	1108371	34022	118127	1177	12.69	.39	1.35	.013
70	10	174451	24083	126453	1499	2.49	.34	1.81	.021
70	11	0	0	90639	374	0.00	0.00	1.94	.008
70	12	0	2415	43154	45	0.00	.07	1.17	.001
		5372847	308815	986130	15148	8.12	.47	1.49	.023
71	1	37375	49857	52374	666	1.17	1.56	1.64	.021
71	2	45063	28745	33803	1873	2.06	1.31	1.54	.086
71	3	0	17677	24120	1571	0.00	.93	1.27	.083
71	4	0	0	11522	73	0.00	0.00	1.10	.007
71	5	602927	69625	26522	291	49.60	5.73	2.18	.024
■1	5	602927	69625	26522	291	49.60	5.73	2.18	.024
71	6	1714822	50273	33539	621	58.93	1.73	1.15	.021
71	7	472036	29475	47673	339	18.48	1.15	1.87	.013
71	8	568889	30107	63576	468	17.51	.93	1.96	.014
71	9	1201511	34778	108036	1072	14.95	.43	1.34	.013
71	10	920902	35363	121313	1395	13.13	.50	1.73	.020
71	11	16656	3559	106043	446	.31	.07	1.95	.008
71	12	562934	45023	79535	205	8.82	.71	1.25	.003
		6143115	394482	708057	9020	13.61	.87	1.57	.020
72	1	123709	17880	42238	513	4.13	.60	1.41	.017
72	2	317829	28972	38064	2042	11.98	1.09	1.43	.077
72	3	596451	41438	33074	1683	24.23	1.68	1.34	.068
72	4	135121	23030	31789	243	5.33	.91	1.25	.010
72	5	1911366	46543	75515	552	29.93	.73	1.18	.009
72	6	1103508	31469	57616	1679	18.17	.52	.95	.028
72	7	754961	35491	103701	693	13.31	.63	1.83	.012
■2	7	754961	35491	103701	693	13.31	.63	1.83	.012
72	8	734738	31685	156144	1095	9.37	.40	1.99	.014
72	9	522619	25955	95921	977	7.55	.37	1.39	.014
72	10	256254	26759	87385	1036	5.38	.56	1.83	.022
72	11	309884	19383	132240	584	4.55	.28	1.94	.009
72	12	608099	33538	47463	141	16.41	.91	1.28	.004
		7374539	362143	901149	11239	12.54	.62	1.53	.019
73	1	456661	28337	47611	562	13.45	.83	1.40	.017
73	2	237125	25476	37836	2093	9.02	.97	1.44	.080
73	3	209329	28366	28523	1676	9.61	1.30	1.31	.077
73	4	347463	29181	19590	169	25.59	2.15	1.44	.012
73	5	12957	13794	15167	135	1.24	1.32	1.45	.013
73	6	1218319	48282	22030	325	76.81	3.04	1.39	.021
73	7	761928	26071	90769	592	15.39	.53	1.83	.012
73	8	2007616	53479	128111	893	28.62	.76	1.83	.013
73	9	594972	25403	115440	1171	7.00	.30	1.36	.014
■3	9	594972	25403	115440	1171	7.00	.30	1.36	.014
73	10	212903	25490	100559	1193	3.82	.46	1.81	.021
73	11	5756	4298	71864	306	.16	.12	1.96	.008
73	12	343791	42294	44831	168	10.59	1.30	1.38	.005
		6408820	350471	722332	9284	14.20	.78	1.60	.021

74 1	320370	27832	46623	559	9.88	.86	1.44	.017
74 2	0	0	29293	1893	0.00	0.00	1.30	.084
74 3	353600	46249	24974	1131	23.07	3.02	1.63	.074
74 4	299501	29038	22965	191	18.38	1.78	1.41	.012
74 5	226980	33840	21998	211	16.82	2.51	1.63	.016
74 6	1091584	34067	18843	298	69.97	2.18	1.21	.019
74 7	552722	33530	74255	510	14.06	.85	1.89	.013
74 8	1277034	37399	114200	796	21.24	.62	1.90	.013
74 9	610799	29779	69005	702	12.26	.60	1.39	.014
74 10	377294	21937	89998	1053	7.40	.43	1.76	.021
74 11	577458	36327	74096	380	14.82	.93	1.90	.010
#4 11	577458	36327	74096	380	14.82	.93	1.90	.010
74 12	157413	17817	52907	100	3.66	.41	1.23	.002
	5844755	347815	639158	7825	14.69	.87	1.61	.020
75 1	97632	25432	33666	419	4.41	1.15	1.52	.019
75 2	62990	24558	25376	1365	3.93	1.53	1.59	.085
75 3	43050	13874	17107	1079	3.22	1.04	1.28	.081
75 4	18154	20687	22621	184	1.07	1.22	1.34	.011
75 5	507325	46790	30204	282	26.44	2.44	1.57	.015
75 6	0	0	0	0	I	I	I	I
75 7	0	0	0	0	I	I	I	I
75 8	0	0	0	0	I	I	I	I
75 9	0	0	0	0	I	I	I	I
75 10	0	0	0	0	I	I	I	I
75 11	0	0	0	0	I	I	I	I
75 12	0	0	0	0	I	I	I	I
	729151	131341	128974	3329	8.32	1.50	1.47	.038

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AJYQIDX. 02.01.21. 77/02/19.

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THIS IS D I S P O S E D OUTPUT.

IT WILL NOT HAVE A CARD DECK.

PLEASE PUT OUT FOR USER 9364003

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EXHIBIT 7.9: CLADM Quality Output for Western C-4
Using Planned Scenario.

WEST TAMIAMI CANAL BASIN
PATTERN SCENARIO LAND USES

		TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TCN	TCP
63	1	0	72731	39609	554	0.00	3.20	1.74	.024
63	2	31171	44976	54248	2601	.95	1.37	1.66	.079
63	3	23839	60347	37251	2300	.86	2.18	1.35	.083
63	3	23839	60347	37251	2300	.86	2.18	1.35	.083
63	4	2322	7154	11730	88	.23	.72	1.18	.009
63	5	489430	143198	26727	423	32.95	9.64	1.80	.028
63	6	483544	59981	34336	983	13.88	1.72	.99	.028
63	7	68153	43582	23851	229	6.13	3.92	2.14	.021
63	8	415563	74681	31350	335	25.29	4.54	1.91	.020
63	9	1149460	73365	55403	601	23.71	1.51	1.14	.012
63	10	299983	43645	95637	1156	5.28	.77	1.68	.020
63	11	55012	49943	41058	275	2.84	2.58	2.12	.014
63	12	384190	107721	27888	305	21.80	6.11	1.58	.017
		3402667	781324	479087	9850	10.89	2.50	1.53	.032
64	1	17519	16581	36001	450	.68	.64	1.39	.017
64	2	205190	96597	27524	1101	14.99	7.05	2.01	.080
64	3	8038	30065	16446	990	.68	2.54	1.39	.084
64	4	440694	114278	23538	347	43.94	11.40	2.35	.035
64	5	582172	56801	11529	161	75.80	7.40	1.50	.021
64	5	582172	56801	11529	161	75.80	7.40	1.50	.021
64	6	1512720	67058	35549	789	41.60	1.84	.98	.022
64	7	428115	69531	57936	480	13.35	2.17	1.81	.015
64	8	1080295	67732	43321	382	33.87	2.12	1.36	.012
64	9	311432	50350	29415	348	14.48	2.34	1.37	.016
64	10	949428	84681	44590	559	27.88	2.49	1.31	.016
64	11	195893	65600	53304	357	7.16	2.40	1.95	.013
64	12	717459	45415	37114	155	20.09	1.27	1.04	.004
		6448955	764689	416267	6119	22.38	2.65	1.44	.021
65	1	101546	88187	42485	598	4.06	3.53	1.70	.024
65	2	297481	53626	57228	3247	7.06	1.27	1.36	.077
65	3	470960	77810	46255	2629	12.47	2.06	1.22	.070
65	4	169830	56623	22827	244	11.48	3.83	1.54	.016
65	5	0	30311	16607	174	0.00	2.84	1.56	.016
65	6	861043	101916	24464	463	51.89	6.14	1.47	.028
65	7	762018	74786	43618	392	29.86	2.93	1.71	.015
65	7	762018	74786	43618	392	29.86	2.93	1.71	.015
65	8	479492	52670	24516	246	32.34	3.55	1.65	.017
65	9	1358059	74660	34001	374	41.94	2.31	1.05	.012
65	10	1897059	81569	67809	770	31.92	1.37	1.14	.013
65	11	11722	30615	91878	444	.25	.66	1.99	.010
65	12	16904	47833	40179	159	.57	1.61	1.36	.005
		6426114	770606	511867	9739	18.11	2.17	1.44	.027
66	1	332928	108594	53180	732	9.82	3.20	1.57	.022
66	2	106584	59134	33843	1378	3.76	2.08	1.19	.049
66	3	381621	75236	33819	1768	14.92	2.94	1.32	.069
66	4	212591	28184	25368	208	9.90	1.31	1.18	.010
66	5	684315	97598	33345	386	30.21	4.31	1.47	.017

66	6	2188621	77430	45875	988	34.36	1.22	.72	.016
66	7	489420	63901	87008	651	9.17	1.20	1.63	.012
66	8	472789	52296	75323	590	10.55	1.17	1.68	.013
66	9	724965	68078	66487	728	14.09	1.32	1.29	.014
66	9	724965	68078	66487	728	14.09	1.32	1.29	.014
66	10	1152064	59060	76431	893	20.71	1.06	1.37	.016
66	11	286310	53725	71157	404	7.41	1.39	1.84	.010
66	12	22898	38402	35877	130	.84	1.41	1.32	.005
		7055106	781638	637712	8856	15.11	1.67	1.37	.019
67	1	157998	104900	40884	592	6.72	4.46	1.74	.025
67	2	37849	38885	32639	1855	1.71	1.75	1.47	.084
67	3	306536	98874	29201	1283	16.12	5.20	1.54	.067
67	4	0	5721	16679	117	0.00	.39	1.15	.008
67	5	126751	102971	20562	321	16.85	13.69	2.73	.043
67	6	1464057	87001	34124	704	33.78	2.01	.79	.016
67	7	329944	46616	58193	443	9.31	1.32	1.64	.012
67	8	475322	85703	46596	455	16.33	2.94	1.60	.016
67	9	672072	65490	22418	279	28.13	2.74	.94	.012
67	10	890313	52142	44188	523	20.80	1.22	1.03	.012
67	11	205781	53582	41530	283	8.73	2.27	1.76	.012
67	11	205781	53582	41530	283	8.73	2.27	1.76	.012
67	12	65680	68457	29576	203	3.40	3.54	1.53	.011
		4732303	810342	416589	7059	15.55	2.66	1.37	.023
68	1	93138	60721	61253	795	2.20	1.43	1.45	.019
68	2	207153	76266	58583	3233	5.08	1.87	1.44	.079
68	3	22225	34476	41343	2796	.64	.99	1.19	.080
68	4	145361	100135	32973	389	7.68	5.29	1.74	.021
68	5	2673566	77909	77439	609	34.97	1.02	1.01	.008
68	6	2000580	67488	108411	3268	14.96	.50	.81	.024
68	7	297112	45005	211097	1401	2.56	.39	1.82	.012
68	8	486364	69528	145252	1100	6.08	.87	1.82	.014
68	9	929504	79926	110211	1182	10.31	.89	1.22	.013
68	10	678689	52005	210650	2499	5.35	.41	1.66	.020
68	11	52459	26105	149273	670	.69	.34	1.95	.009
68	12	0	5936	63009	70	0.00	.11	1.17	.001
		7586151	695500	1269494	18010	8.52	.78	1.43	.020
		7586151	695500	1269494	18010	8.52	.78	1.43	.020
69	1	785817	167558	89225	1200	13.34	2.84	1.51	.020
69	2	311656	43259	59074	3425	7.16	.99	1.36	.079
69	3	164622	78641	47788	2878	4.55	2.17	1.32	.080
69	4	535904	74077	41706	385	15.89	2.20	1.24	.011
69	5	1009809	67417	74662	630	16.10	1.07	1.19	.010
69	6	1180005	64753	117649	3775	9.39	.52	.94	.030
69	7	689014	67253	137625	969	8.71	.85	1.74	.012
69	8	237026	47126	187856	1360	2.52	.50	2.00	.014
69	9	731012	80875	94237	1029	10.21	1.13	1.32	.014
69	10	1573275	72741	132194	1541	17.55	.81	1.47	.017
69	11	0	36172	207583	933	0.00	.34	1.97	.009
69	12	110308	47025	79897	191	1.70	.73	1.23	.003
		7328448	846897	1269495	18317	8.47	.98	1.47	.021
70	1	278718	101027	85319	1114	4.90	1.78	1.50	.020
70	2	230961	41828	60568	3564	5.25	.95	1.38	.081

1

#0	2	230961	41828	60568	3564	5.25	.95	1.38	.081
70	3	330787	75621	53025	3212	7.88	1.80	1.26	.077
70	4	133804	28267	51754	377	3.01	.64	1.16	.008
70	5	1675694	129870	67706	663	30.86	2.39	1.25	.012
70	6	502471	51721	84056	2759	5.83	.60	.97	.032
70	7	324865	74427	129199	940	4.80	1.10	1.91	.014
70	8	325735	63217	140807	1063	4.72	.92	2.04	.015
70	9	1017424	62286	120227	1257	11.04	.68	1.30	.014
70	10	135531	57147	143136	1742	1.71	.72	1.81	.022
70	11	0	0	102629	423	0.00	0.00	1.94	.008
70	12	0	5086	49169	55	0.00	.12	1.18	.001
		4955990	690497	1087595	17170	6.78	.95	1.49	.024
71	1	26501	119616	63019	882	.74	3.35	1.77	.025
71	2	34241	85018	42268	2195	1.40	3.49	1.73	.090
71	3	0	42630	28994	1830	0.00	1.97	1.34	.085
71	4	0	0	12404	79	0.00	0.00	1.10	.007
#1	4	0	0	12404	79	0.00	0.00	1.10	.007
71	5	575471	91490	39005	591	38.47	6.12	2.61	.040
71	6	1563008	90892	37941	811	41.31	2.40	1.00	.021
71	7	423062	65771	46280	400	16.69	2.60	1.83	.016
71	8	479836	66864	63068	533	14.25	1.99	1.87	.016
71	9	1105194	60017	107043	1114	13.22	.72	1.28	.013
71	10	812247	73886	125129	1504	10.88	.99	1.68	.020
71	11	6197	7517	121662	518	.10	.12	1.94	.008
71	12	498877	108962	87114	360	7.34	1.60	1.28	.005
		5524634	812663	773928	10818	11.19	1.65	1.57	.022
72	1	97418	39891	46721	597	2.99	1.22	1.43	.018
72	2	248422	73399	42222	2177	8.80	2.60	1.50	.077
72	3	548875	98715	36539	1717	21.70	3.90	1.44	.068
72	4	110542	55981	36867	335	3.91	1.98	1.30	.012
72	5	1820854	77068	75982	629	25.83	1.09	1.08	.009
72	6	1070478	55166	56919	1668	16.67	.86	.89	.026
#2	6	1070478	55166	56919	1668	16.67	.86	.89	.026
72	7	595490	75958	104033	776	10.06	1.28	1.76	.013
72	8	520848	65329	164630	1225	6.11	.77	1.93	.014
72	9	368969	55507	102962	1105	4.88	.73	1.36	.015
72	10	179173	63658	96711	1200	3.42	1.22	1.85	.023
72	11	224311	45309	146787	699	2.95	.60	1.93	.009
72	12	509366	75147	50385	241	13.00	1.92	1.29	.006
		6294746	781128	960758	12369	9.89	1.23	1.51	.019
73	1	386178	62393	48911	630	11.12	1.80	1.41	.018
73	2	181430	63258	42795	2304	6.32	2.20	1.49	.080
73	3	176939	72662	33412	1852	7.54	3.10	1.42	.079
73	4	328996	71291	21533	259	25.24	5.47	1.65	.020
73	5	0	31235	17274	180	0.00	2.75	1.52	.016
73	6	1105401	103483	28154	537	49.38	4.62	1.26	.024
73	7	694226	49893	90595	642	13.46	.97	1.76	.012
73	8	1888361	91793	125069	957	25.22	1.23	1.67	.013
#3	8	1888361	91793	125069	957	25.22	1.23	1.67	.013
73	9	548451	52532	122269	1288	6.01	.58	1.34	.014
73	10	169338	61227	112623	1385	2.72	.98	1.81	.022
73	11	0	10288	82042	361	0.00	.25	1.96	.009
73	12	272899	109443	52395	329	7.74	3.10	1.49	.009
		5752219	779498	777072	10724	11.72	1.59	1.58	.022

74	1	271875	64750	50607	660	7.90	1.88	1.47	.019
74	2	0	0	33151	2142	0.00	0.00	1.30	.084
74	3	256711	118097	29640	1196	17.00	7.82	1.96	.079
74	4	290138	71215	25769	286	17.70	4.34	1.57	.017
74	5	187487	85158	24943	320	14.25	6.47	1.90	.024
74	6	1055856	62729	22327	430	49.60	2.95	1.05	.020
74	7	482454	77705	77076	614	11.63	1.87	1.86	.015
74	8	1169708	65522	108402	821	19.07	1.07	1.77	.013
74	9	540779	64978	72702	801	10.08	1.21	1.36	.015
74	10	338225	46307	96218	1164	6.12	.84	1.74	.021
74	10	338225	46307	96218	1164	6.12	.84	1.74	.021
74	11	539895	86934	74544	486	13.74	2.21	1.90	.012
74	12	145132	42818	60097	163	3.03	.89	1.25	.003
		5278260	786213	675476	9083	12.42	1.85	1.59	.021
75	1	82282	63609	38817	527	3.43	2.66	1.62	.022
75	2	49389	62711	30908	1590	2.74	3.48	1.72	.088
75	3	30548	35923	20646	1248	2.02	2.38	1.37	.083
75	4	5332	49536	26425	259	.29	2.71	1.45	.014
75	5	446558	126101	37825	477	20.54	5.80	1.74	.022
75	6	0	0	0	0	I	I	I	I
75	7	0	0	0	0	I	I	I	I
75	8	0	0	0	0	I	I	I	I
75	9	0	0	0	0	I	I	I	I
75	10	0	0	0	0	I	I	I	I
75	11	0	0	0	0	I	I	I	I
75	12	0	0	0	0	I	I	I	I
		614109	337880	154621	4101	6.33	3.48	1.59	.042

AJYQJYE. 16.24.06. 77/02/19.

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****

THIS IS D I S P O S E D OUTPUT.

IT WILL NOT HAVE A CARD DECK.

PLEASE PUT OUT FOR USER 9364003

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EXHIBIT 7.10: Input Set for C-14 Basin

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WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM

A1                              HILLSBORO + C-14
A2     JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3                  73-4 LAND USES WEST HILL + BP C-14
#3                  73-4 LAND USES WEST HILL + BP C-14
B1     1        0        1        0        1        0
B2    10        1       12   621201       12
C1 BOCA RATON RAINFALL                    11        0   630101   741231      1
E1 HIL+C14                       5      4.6  .000001
E228722.       .2       .9       1.        0
E3     .1    .104     .048     .078     .169     .182     .213     .216     .219     .200
E3   .156    .129     .082
F1SINGLE    19.94     39.2     100.    99999
F2     5. .000001  .000001     .446    .0562    .0117
F1MULTPL     1.90     70.8     100.    99999
F2     5. .000001  .000001    1.055    .2341    .0383
F1COMMCL     1.01     87.1     100.    99999
F2     5. .000001  .000001    4.478    .3122    .1066
F1INDSTL     9.12     10.8     100.    99999
F2     5. .000001  .000001    1.758    .4948    .0689
F1OPEN      68.03      5.0     100.    99999
F2     5. .000001  .000001     .122    .0758   .00244
H151437.      .23      1.0        0                                 .46
H2    .27    .104     .048     .078     .169     .182     .213     .216     .219     .200
H2   .156    .129     .082
J1 4.136    .4136    .0135   .01401  .000583
T1      0
T2    0.0                                2
T3.00001
#3.00001

A1                              HILLSBORO + C-14
A2     JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3               PLAN SCENARIO LAND USES WEST HILL + BP C-14
B1     1        0        1        0        1        0
B2    10        1       12   621201       12
C1 BOCA RATON RAINFALL                    11        0   630101   741231      1
E1 HIL+C14                       5      4.6  .000001
E274918.       .2     .525       1.        0
E3     .1    .104     .048     .078     .169     .182     .213     .216     .219     .200
E3   .156    .129     .082
F1SINGLE    86.15     22.7     100.    99999
F2     5. .000001  .000001     .446    .0562    .0117
F1MULTPL     3.40     65.0     100.    99999
F2     5. .000001  .000001    1.055    .2341    .0383
F1COMMCL     2.02     84.6     100.    99999
F2     5. .000001  .000001    4.478    .3122    .1066
F1INDSTL     4.09     65.6     100.    99999
F2     5. .000001  .000001    1.758    .4948    .0689
F1OPEN       4.34     19.6     100.    99999
F2     5. .000001  .000001     .122    .0758   .00244
H1 5241.      .23       1.        0                                 .46
H2     .3    .104     .048     .078     .169     .182     .213     .216     .219     .200
#2     .3    .104     .048     .078     .169     .182     .213     .216     .219     .200
H2   .156    .129     .082
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T1     0
T2   0.0                                         2
T3.00001

A1                                        HILLSBORO + C-14
A2       JAY G FOY  CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT
A3                  PLAN SCENARIO LAND USES WEST HILL + BP C-14 URBAN
B1       1        0        1        0        1        0
B2      10        1       12   621201       12
C1 BOCA RATON RAINFALL                      11        0   630101   741231        1
E1 HIL+C14                 5      4.6  .000001
E274918        .2       .525        1.       0
E3      .1     .104     .048     .078     .169     .182     .213     .216     .219     .200
E3    .156     .129     .082
F1SINGLE     86.15     22.7     100.    99999
F2       5.  .000001  .000001     .446    .0562    .0117
F1MULTPL      3.40     65.0     100.    99999
F2       5.  .000001  .000001    1.055    .2341    .0383
F1COMMCL      2.02     84.6     100.    99999
F2       5.  .000001  .000001    4.478    .3122    .1066
F1INDSTL      4.09     65.6     100.    99999
F2       5.  .000001  .000001    1.758    .4948    .0689
F1OPEN        4.34     19.6     100.    99999
H1OPEN        4.34     19.6     100.    99999
F2       5.  .000001  .000001     .122    .0758   .00244
H1.00001       .23       1.        0                                .46
H2      .3     .104     .048     .078     .169     .182     .213     .216     .219     .200
H2    .156     .129     .082
J1 3.569     .3569    .0114   .01309  .000508
T1     0
T2   0.0                                         2
T3.00001

HIL+C14            103.        43.        77.       162.       180.       203.      214.
HIL+C14            216.       191.       154.       124.        81.        SWETH
HIL+C14            944.       397.       704.      1484.      1648.      1867.     1960.
HIL+C14           1984.      1756.      1411.      1134.       742.        SWETF
   .144                                                                    RIFI
HIL+C14 63        3913.     14073.      5349.      1382.      5155.      8184.     5905.
HIL+C14           7876.     20682.     26652.      8618.      3995.        DISH
HIL+C14 64       20097.     15894.      5702.      5373.     13599.     24746.     6206.
HIL+C14          20862.     15400.     44041.     15592.     13258.        DISH
HIL+C14 65         970.      8410.      3098.       950.       313.     12698.    28580.
HIL+C14          18468.     15640.     77369.     37966.      6611.        DISH
HIL+C14 66       18625.     23633.     10217.      1847.      7688.     66050.    58350.
HIL+C14 66       18625.     23633.     10217.      1847.      7688.     66050.    58350.
HIL+C14          16786.     20158.     54137.      9999.      2398.        DISH
HIL+C14 67        8303.      7307.      4776.       167.       186.     59865.    25033.
HIL+C14          22126.     16776.     45832.      6928.      5006.        DISH
HIL+C14 68        2198.      3045.       353.        40.     49192.     76897.    47540.
HIL+C14          19936.     33900.     67099.      9334.       516.        DISH
HIL+C14 69       11355.      5615.     18571.      7694.     21695.     44287.    25507.
HIL+C14          36252.     27223.     32577.     40980.     27380.        DISH
HIL+C14 70       19365.     15612.     52042.     10834.     17264.     35601.    38588.
HIL+C14          10863.     16570.     22931.       347.         0         DISH
HIL+C14 71          40.       264.         0          0       5919.      2999.     1462.
HIL+C14           3661.     17270.     18629.     21471.      5169.        DISH
HIL+C14 72        4911.      6627.      4645.     11272.     20892.     34957.    32670.
HIL+C14          22433.     15372.     12833.     16120.      9118.        DISH
HIL+C14 73        5996.      3596.      4149.       238.       732.     10693.    36847.
HIL+C14          45640.     43636.     17387.     22945.      6272.        DISH
HIL+C14          45640.     43636.     17387.     22945.      6272.        DISH
HIL+C14 74       33160.      3441.       579.       502.       863.     11566.    22806.
HIL+C14          26075.     11103.     42500.     11480.      6742.        DISH
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HIL+C14                                                                    ONPSCNSS
HIL+C14
HIL+C14                                                                    ONPSCNBOD
HIL+C14         1.24      1.20      1.20      1.20      1.20      1.30        2.86
HIL+C14         2.26      1.21      2.07      1.20      1.28          ONPSCNN
HIL+C14         .048      .050      .050      .050      .050      .050        .069
HIL+C14         .276      .179      .431      .100      .180          ONPSCNP
HIL+C14          0.0       0.0      .227      .227                    REFF

        AJYQMGL.   76/12/04.FLORIDA STATE UNIVERSITY KRONOS

16.50.13.JGF,T550,CM120000,MO.   FOY
16.50.13.ACCOUNT,9364003,.
16.50.13.STAGEI,RI1098,7782/+3,TAPE11.
16.54.26.MT51, ASSIGNED TO STAGEIN, VSN=****51.
16.54.34. STAGING COMPLETE.
16.54.34.CALL,PROG1.
16.54.35.CBR,,CARDS.
16.54.36. COPY COMPLETE.
16.54.36.CBR,,CARD2.
16.54.36. COPY COMPLETE.
16.54.36.CBR,,IP1.
16.54.36. COPY COMPLETE.
16.54.36.CBR,,IP2.
16.54.36.CBR,,IP2.
16.54.36. COPY COMPLETE.
16.54.36.CBR,,IP3.
16.54.36. COPY COMPLETE.
16.54.36.G,STORM,SUMMB.
16.54.41.CALL (PROG2(LFN=LAND,NAME=IP1)
16.54.42.RA,INPUT.
16.54.42.ASSIGN,MS,OUTPUT.
16.54.42.DI00, ASSIGNED TO OUTPUT.
16.54.43.STORM(IP1)
17.00.33.STOP
17.00.33.RENAME,QUAL=TAPE13.
17.00.33.RENAME,OUT=OUTPUT.
17.00.33.RA,INPUT.
17.00.34.SUMMB.
17.03.01.STOP
17.03.02.RENAME,LAND=QUALSUM.
17.03.02.DISPOSE,QUAL=PR/EI=9364003.
17.03.03.RT,OUT.
17.03.03.CALL (PROG2(LFN=SCENAR,NAME=IP2)
17.03.03.RA,INPUT.
17.03.04.ASSIGN,MS,OUTPUT.
17.03.04.DI00, ASSIGNED TO OUTPUT.
17.03.05.STORM(IP2)
17.06.07.STOP
17.06.07.RENAME,QUAL=TAPE13.
17.06.07.RENAME,OUT=OUTPUT.
17.06.07.RA,INPUT.
17.06.36.SUMMB.
17.08.21.STOP
17.08.22.RENAME,SCENAR=QUALSUM.
17.08.22.DISPOSE,QUAL=PR/EI=9364003.
17.08.23.RT,OUT.
17.08.23.CALL (PROG2(LFN=SCENARU,NAME=IP3)
17.08.23.CALL (PROG2(LFN=SCENARU,NAME=IP3)
17.08.24.RA,INPUT.
17.08.25.ASSIGN,MS,OUTPUT.
17.08.25.DI00, ASSIGNED TO OUTPUT.
```

EXHIBIT 7.11: CLADM Hydrologic Output for Western C-14 Using 1973-74 Land Uses and Planned Scenario.

HILLSBORO + C-14 BASIN

	73-74 LAND USES						* SCENARIO LAND USES				
	RAINFALL	DISCHARGE	RUNOFF	SWET	DSET	NGWL	NGWL	RUNOFF	DSET	SWET	DISCHARGE
63 1	15497	3913	2405	103	6083	5398	4719	3140	4443	944	5391
■3 1	15497	3913	2405	103	6083	5398	4719	3140	4443	944	5391
63 2	41282	14073	9151	43	5455	21711	18978	10688	3649	397	18258
63 3	31596	5349	6814	77	4922	21248	18573	7949	3606	704	8713
63 4	6212	1382	1136	162	1767	2901	2536	1336	1508	1484	684
63 5	86906	5155	19906	180	8976	72595	63457	22979	5995	1648	15806
63 6	49899	8184	8417	203	16949	24563	21471	10688	12266	1867	14295
63 7	13493	5905	935	214	9832	-2458	-2812	1870	6908	1960	7437
63 8	36272	7876	7148	216	8290	19890	17386	8350	6871	1984	10031
63 9	83566	20682	17835	191	13743	48950	42788	20574	11122	1756	27900
63 10	47494	26652	10287	154	7222	13466	11771	11957	5392	1411	28920
63 11	16165	8618	2806	124	5182	2241	1959	3474	3935	1134	9137
63 12	24983	3995	5478	81	3539	17368	15182	6480	2168	742	6891
	453365	111784	92318	1748	91960	247873	216009	109485	67863	16031	153462
■	453365	111784	92318	1748	91960	247873	216009	109485	67863	16031	153462
64 1	12358	20097	2271	103	3467	-11309	-12937	2939	2009	944	22342
64 2	25517	15894	5411	43	4335	5245	4585	6413	2937	397	17598
64 3	21376	5702	4676	77	3070	12527	10950	5544	1854	704	7868
64 4	29124	5373	6146	162	5066	18523	16191	7281	3487	1484	7962
64 5	41415	13599	8016	180	10034	17602	15386	10087	5899	1648	18482
64 6	52972	24746	10755	203	10869	17154	14995	12558	8753	1867	27357
64 7	35470	6206	6012	214	11934	17116	14962	7482	9127	1960	9421
64 8	52705	20862	11489	216	7725	23902	20893	13427	5428	1984	24400
64 9	42150	15400	7415	191	13123	13436	11745	9419	8986	1756	19663
64 10	74347	44041	16833	154	8447	21705	18973	19372	6138	1411	47825
64 11	4208	15592	200	124	3424	-14932	-17082	401	2797	1134	17359
■4 11	4208	15592	200	124	3424	-14932	-17082	401	2797	1134	17359
64 12	12892	13258	2204	81	4262	-4709	-5387	3006	2308	742	15229
	404534	200770	81428	1748	85756	116260	93273	97929	59723	16031	235507
65 1	4876	970	468	103	3046	757	662	735	2289	944	981
65 2	35070	8410	7348	43	6303	20314	17757	8817	4022	397	12894
65 3	6480	3098	735	77	3603	-298	-341	1136	2481	704	3636
65 4	4743	950	868	162	1343	2288	2000	1136	744	1484	515
65 5	8149	313	1136	180	3704	3952	3455	1536	2740	1648	306
65 6	72878	12698	15698	203	11423	48554	42442	18303	8431	1867	20138
65 7	73546	28580	15297	214	13660	31092	27178	18169	9570	1960	34838
65 8	22979	18468	3273	216	10165	-5870	-6715	4476	7220	1984	20490
65 9	27788	15640	4476	191	10267	1690	1477	5878	7090	1756	17465
65 10	197993	77369	48429	154	8398	112072	97965	54642	5594	1411	93023
■5 10	197993	77369	48429	154	8398	112072	97965	54642	5594	1411	93023
65 11	26319	37966	5344	124	5398	-17169	-19641	6480	3504	1134	41322
65 12	6747	6611	868	81	3347	-3292	-3766	1202	2513	742	7258
	487568	211073	103940	1748	80657	194090	162473	122510	56198	16031	252866
66 1	21843	18625	3407	103	8506	-5391	-6167	4609	5614	944	21452
66 2	38677	23633	9352	43	2065	12936	11308	10554	1514	397	25458
66 3	12358	10217	2071	77	4251	-2187	-2502	2472	3655	704	10501
66 4	11089	1847	1670	162	4551	4529	3959	2271	3092	1484	2554
66 5	32932	7688	5611	180	10965	14099	12324	6880	8706	1648	10254
66 6	110285	66050	29325	203	-4517	48549	42438	34268	-10376	1867	76356
66 7	50968	58350	3874	214	35800	-43396	-49645	5277	32396	1960	66267

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■6 8	41[illegible]	16786	6680	216	15131	9143	7997	8483	11411	1984	19890
66 9	55[illegible]	20158	10688	191	13735	21493	18788	13093	9476	1756	25557
66 10	46425	54137	9953	154	7460	-15326	-17533	11623	5499	1411	57048
66 11	7081	9999	601	124	4727	-7769	-8888	868	4023	1134	10812
66 12	6680	2398	334	81	5372	-1171	-1340	802	3857	742	3421
	435197	289888	83566	1748	108046	35515	10739	101200	78857	16031	329570
67 1	16099	8303	2138	103	7730	-37	-42	2939	5750	944	9447
67 2	15631	7307	2872	43	4386	3895	3405	3474	3400	397	8429
67 3	23847	4776	4743	77	5280	13714	11988	5611	4090	704	7065
67 4	0	167	0	162	0	-329	-376	0	0	1484	0
67 5	13827	186	2204	180	5198	8263	7223	2872	3714	1648	134
67 6	79224	59865	15564	203	18292	864	755	18971	12425	1867	64177
67 7	24782	25033	3273	214	11969	-12434	-14224	4476	9024	1960	28022
■7 7	24782	25033	3273	214	11969	-12434	-14224	4476	9024	1960	28022
67 8	45624	22126	7615	216	15812	7470	6530	9886	10813	1984	26297
67 9	49498	16776	8751	191	15240	17291	15115	10755	11630	1756	20997
67 10	36205	45832	6814	154	9531	-19312	-22093	8283	7040	1411	49847
67 11	24782	6928	5010	124	5169	12561	10980	6012	3614	1134	9054
67 12	11089	5006	1603	81	4812	1190	1040	2271	3092	742	6215
	340608	202305	60587	1748	103419	33136	20299	75550	74592	16031	229686
68 1	8417	2198	1336	103	3187	2929	2560	1670	2537	944	2376
68 2	17368	3045	2872	43	6123	8157	7130	3607	4667	397	5174
68 3	13360	353	2338	77	4207	8723	7625	3006	2776	704	2255
68 4	6012	40	1002	162	2089	3721	3253	1269	1543	1484	0
68 5	82831	49192	16700	180	17454	16005	13990	19839	12975	1648	53950
68 6	100733	76897	23046	203	10512	13121	11469	26586	7121	1867	80276
■8 6	100733	76897	23046	203	10512	13121	11469	26586	7121	1867	80276
68 7	44021	47540	9485	214	6886	-10619	-12148	11155	4741	1960	49468
68 8	42751	19936	8216	216	10586	12013	10501	10153	7000	1984	23266
68 9	88175	33900	18837	191	14429	39655	34663	22044	10557	1756	41199
68 10	43419	67099	8751	154	9162	-32996	-37747	10087	7903	1411	71852
68 11	9819	9334	1603	124	3543	-3182	-3640	2138	2293	1134	10032
68 12	3340	516	468	81	1509	1234	1079	735	753	742	766
	460246	310050	94654	1748	89687	58761	38735	112289	64866	16031	340614
69 1	31396	11355	6680	103	5245	14693	12844	7949	3406	944	14202
69 2	11356	5615	2538	43	1418	4280	3741	3006	772	397	6446
69 3	40079	18571	8016	77	8698	12733	11130	9619	6210	704	22035
69 4	8016	7694	534	162	5924	-5764	-6594	1069	4253	1484	8873
69 5	24716	21695	3140	180	12425	-9584	-10964	4275	9662	1648	24370
■9 5	24716	21695	3140	180	12425	-9584	-10964	4275	9662	1648	24370
69 6	92183	44287	19439	203	16084	31609	27630	22645	12448	1867	50238
69 7	53439	25507	9619	214	15782	11936	10434	11957	11337	1960	29708
69 8	32732	36252	5210	216	12334	-16070	-18384	6546	9681	1984	39451
69 9	67467	27223	12224	191	19611	20442	17869	14963	14781	1756	33061
69 10	22712	32577	3073	154	10682	-20701	-23682	4142	8129	1411	36854
69 11	9819	40980	1603	124	3543	-34828	-39843	2138	2293	1134	46235
69 12	3340	27380	534	81	1248	-25369	-29022	735	753	742	30867
	397255	299136	72610	1748	112994	-16623	-44842	89044	83725	16031	342341
70 1	27388	19365	5611	103	5421	2499	2184	6680	3867	944	20393
70 2	22712	15612	4810	43	3883	3174	2774	5812	2249	397	17292
70 3	64127	52042	14562	77	7118	4890	4274	16833	4855	704	54294
■0 3	64127	52042	14562	77	7118	4890	4274	16833	4855	704	54294
70 4	0	10834	0	162	0	-10996	-12579	0	0	1484	11095
70 5	30728	17264	6012	180	7192	6092	5325	6947	6266	1648	17489
70 6	82163	35601	17101	203	15216	31143	27223	20173	11131	1867	41942
70 7	42017	38588	9018	214	6713	-3498	-4002	10487	5089	1960	38970
70 8	33466	10863	6480	216	8100	14287	12489	7882	5712	1984	13281
70 9	33400	16570	5611	191	11433	5206	4551	7348	7527	1756	19566
70 10	16032	22931	1603	154	9756	-16809	-19229	2138	8505	1411	25345
70 11	4008	347	134	124	3485	52	45	401	2597	1134	232
70 12	3407	0	134	81	2884	442	386	401	1996	742	283

71	1	961[illegible]	40	1670	103	3081	6395	5590	2204	1857	944	1228
71	2	9352	264	1269	43	4383	4662	4075	1804	3001	397	1879
■1	2	9352	264	1269	43	4383	4662	4075	1804	3001	397	1879
71	3	2672	0	134	77	2149	446	390	334	1496	704	82
71	4	4676	0	668	162	2061	2453	2144	935	1383	1484	0
71	5	36740	5919	6747	180	10327	20314	17757	8283	7574	1648	9426
71	6	34068	2999	4810	203	15239	15627	13660	6613	10782	1867	7759
71	7	18036	1462	2204	214	9406	6954	6079	2939	7687	1960	2310
71	8	26052	3661	3674	216	11669	10506	9184	4943	8646	1984	6238
71	9	46091	17270	8684	191	12095	16535	14454	10487	9164	1756	20717
71	10	39412	18629	7081	154	11691	8938	7813	8617	9070	1411	21118
71	11	22044	21471	4142	124	5830	-5381	-6156	4810	5109	1134	21957
71	12	17368	5169	3340	81	4292	7826	6841	4008	3255	742	6530
		266130	76884	44423	1748	92223	95275	81830	55977	69024	16031	99245
72	1	15364	4911	2338	103	6211	4139	3618	3006	4780	944	6022
■2	1	15364	4911	2338	103	6211	4139	3618	3006	4780	944	6022
72	2	17368	6627	3340	43	4292	6406	5600	4142	2785	397	8586
72	3	37408	4645	8751	77	3150	29536	25818	10020	2127	704	8759
72	4	18704	11272	2605	162	8505	-1235	-1413	3540	6238	1484	12395
72	5	36072	20892	5144	180	15935	-935	-1070	7014	11375	1648	24119
72	6	74815	34957	13627	203	21467	18188	15899	16767	15778	1867	41271
72	7	62123	32670	12024	214	15051	14188	12402	14629	10613	1960	37148
72	8	18704	22433	2071	216	10597	-14542	-16636	3073	7884	1984	25472
72	9	18036	15372	2271	191	9144	-6671	-7632	2872	7922	1756	15990
72	10	30728	12833	6146	154	6669	11072	9678	7415	4620	1411	15019
72	11	46091	16120	9953	124	7126	22721	19861	11489	5636	1134	19460
72	12	12024	9118	1403	81	6532	-3707	-4241	1937	5203	742	10320
		387437	191850	69673	1748	114679	79160	61885	85904	84961	16031	224560
■		387437	191850	69673	1748	114679	79160	61885	85904	84961	16031	224560
73	1	11356	5996	1670	103	4818	439	384	2204	3594	944	6434
73	2	19706	3596	3474	43	6107	9960	8706	4409	4182	397	6421
73	3	13360	4149	2338	77	4207	4927	4307	3006	2776	704	5573
73	4	7348	238	601	162	4994	1954	1708	1136	3349	1484	807
73	5	19372	732	2872	180	8127	10333	9032	3741	6200	1648	2492
73	6	49765	10693	9552	203	12369	26500	23164	11556	9075	1867	15659
73	7	54775	36847	10755	214	12672	5042	4407	13026	8910	1960	39498
73	8	88175	45640	26653	216	-16167	58486	51124	31128	-21431	1984	56498
73	9	61455	43636	3808	191	46549	-28921	-33086	5478	42168	1756	50617
73	10	36072	17387	5878	154	13059	5472	4783	7548	9493	1411	20385
73	11	15364	22945	2071	124	7257	-14962	-17117	3006	4780	1134	26567
73	12	16032	6272	3006	81	4264	5415	4733	3741	2860	742	7697
■3	12	16032	6272	3006	81	4264	5415	4733	3741	2860	742	7697
		392780	198131	72678	1748	108256	84645	62147	89979	75956	16031	238646
74	1	78957	33160	18837	103	5211	40483	35387	21443	3455	944	39171
74	2	0	3441	0	43	0	-3484	-3986	0	0	397	3589
74	3	11356	579	2405	77	1942	8758	7656	2806	1477	704	1519
74	4	4676	502	534	162	2584	1428	1248	868	1618	1484	326
74	5	18704	863	2739	180	7982	9679	8461	3540	6238	1648	2357
74	6	34068	11566	5277	203	13408	8891	7772	6880	9841	1867	14588
74	7	50767	22806	8617	214	17033	10714	9365	10955	12193	1960	27249
74	8	22177	26075	3540	216	8317	-12431	-14221	4609	5948	1984	28466
74	9	36740	11103	6546	191	11112	14334	12530	8016	8515	1756	13939
74	10	80159	42500	19171	154	5106	32399	28321	21843	3246	1411	47181
74	11	54775	11480	11690	124	9011	34160	29860	13827	6088	1134	17693
■4	11	54775	11480	11690	124	9011	34160	29860	13827	6088	1134	17693
74	12	2672	6742	134	81	2149	-6300	-7207	334	1496	742	7641
		395051	170817	79490	1748	83855	138631	115186	95121	60115	16031	203719

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EXHIBIT 7.12: CLADM Quality Output for Western C-14 Using 1973-74 Land Uses

73-74 LAND USES
HILLSBORO + C-14 BASINS

	TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TCN	TCP
63 1	193614	28457	13822	1071	18.21	2.68	1.30	.101
13 1	193614	28457	13822	1071	18.21	2.68	1.30	.101
63 2	1198745	21202	25136	1364	31.34	.55	.66	.036
63 3	1027948	20211	10294	691	70.71	1.39	.71	.048
63 4	285953	7325	3628	268	76.13	1.95	.97	.071
63 5	544631	13510	8412	487	38.87	.96	.60	.035
63 6	2145541	21607	11510	749	96.46	.97	.52	.034
63 7	149899	15706	43560	1415	9.34	.98	2.71	.088
63 8	850401	21578	15255	1281	39.73	1.01	.71	.060
63 9	3005926	34128	31488	2632	53.48	.61	.56	.047
63 10	589857	15586	100473	19708	8.14	.22	1.39	.272
63 11	921730	15646	25749	2094	39.35	.67	1.10	.089
63 12	560662	25260	10485	822	51.64	2.33	.97	.076
	11474908	240215	299812	32581	37.77	.79	.99	.107
64 1	813419	13992	66122	2784	14.89	.26	1.21	.051
64 2	2139841	24309	46472	2253	49.54	.56	1.08	.052
64 3	1045801	25108	18070	1029	67.49	1.62	1.17	.066
14 3	1045801	25108	18070	1029	67.49	1.62	1.17	.066
64 4	1412287	32905	19401	1168	96.71	2.25	1.33	.080
64 5	3482612	28447	37406	1809	94.23	.77	1.01	.049
64 6	2896974	32914	70939	3104	43.08	.49	1.05	.046
64 7	1166323	24400	16321	909	69.15	1.45	.97	.054
64 8	1746328	38600	82801	8445	30.80	.68	1.46	.149
64 9	2108157	26183	41447	4811	50.37	.63	.99	.115
64 10	3015315	37388	178601	33257	25.19	.31	1.49	.278
64 11	17064	7837	52517	4422	.40	.18	1.24	.104
64 12	508130	25775	47182	6212	14.10	.72	1.31	.172
	20352251	317858	677279	70203	37.30	.58	1.24	.129
65 1	91187	6866	3909	278	34.59	2.60	1.48	.106
65 2	1116940	33240	18285	1242	48.87	1.45	.80	.054
65 3	144570	13144	11878	726	17.17	1.56	1.41	.086
65 4	447421	20524	7321	653	173.29	7.95	2.84	.253
65 5	181716	3756	1535	122	213.62	4.42	1.80	.143
15 5	181716	3756	1535	122	213.62	4.42	1.80	.143
65 6	1275186	45173	33992	1730	36.95	1.31	.98	.050
65 7	3963378	36478	125949	3808	51.03	.47	1.62	.049
65 8	797599	18678	100702	11998	15.89	.37	2.01	.239
65 9	1242140	17001	44681	6001	29.22	.40	1.05	.141
65 10	1518434	38045	187325	35285	7.22	.18	.89	.168
65 11	816669	14807	112685	9349	7.91	.14	1.09	.091
65 12	281301	18768	26118	3391	15.66	1.04	1.45	.189
	11876541	266481	674379	74585	20.70	.46	1.18	.130
66 1	1229632	23278	61047	2743	24.29	.46	1.21	.054
66 2	1466238	24460	62136	2829	22.83	.38	.97	.044
66 3	924734	15892	33439	1629	33.30	.57	1.20	.059
66 4	622476	22823	8727	743	124.01	4.55	1.74	.148
66 5	3032293	29320	22689	1300	145.13	1.40	1.09	.062
66 6	2534589	43211	163125	6659	14.12	.24	.91	.037
66 7	758356	17959	430502	10795	4.78	.11	2.71	.068
16 7	758356	17959	430502	10795	4.78	.11	2.71	.068
66 8	2527100	22299	74715	8364	55.39	.49	1.64	.183
66 9	3958726	32261	52609	5796	72.26	.59	.96	.106
66 10	1229634	28625	267204	52804	8.36	.19	1.82	.359
66 11	134508	15125	35373	3019	4.95	.56	1.30	.111
66 12	72296	18113	12619	1564	11.09	2.78	1.94	.240

67	1	1150794	21777	29909	1514	51.00	.97	1.33	.067
67	2	725089	22016	25068	1344	36.51	1.11	1.26	.068
67	3	1476955	30633	17488	1081	113.79	2.36	1.35	.083
67	4	0	0	545	23	0.00	0.00	1.20	.050
67	5	94204	3180	1360	104	186.35	6.29	2.69	.206
67	6	4724772	57794	201911	8267	29.04	.36	1.24	.051
67	7	1456469	19130	178249	4724	21.41	.28	2.62	.069
67	8	4132203	33015	108798	12062	68.72	.55	1.81	.201
67	9	2680909	30390	46636	5023	58.80	.67	1.02	.110
[illegible]7	9	2680909	30390	46636	5023	58.80	.67	1.02	.110
67	10	2331686	22462	234161	46525	18.72	.18	1.88	.374
67	11	137611	19198	17046	1194	7.31	1.02	.91	.063
67	12	549901	24895	20412	2444	40.42	1.83	1.50	.180
		19460593	284490	881584	84305	35.39	.52	1.60	.153
68	1	622700	11723	7830	494	104.24	1.96	1.31	.083
68	2	1527749	27815	12371	934	184.61	3.36	1.49	.113
68	3	186107	2569	1200	86	193.99	2.68	1.25	.090
68	4	21464	944	327	30	197.44	8.68	3.00	.272
68	5	5017055	48902	142167	6279	37.53	.37	1.06	.047
68	6	3221473	25654	210450	8315	15.41	.12	1.01	.040
68	7	888888	7617	300178	7406	6.88	.06	2.32	.057
68	8	1004782	30513	83302	9760	18.54	.56	1.54	.180
68	9	3170890	33672	71930	8567	34.42	.37	.78	.093
68	10	616496	14288	336348	68851	3.38	.08	1.84	.378
68	11	204930	13151	29534	2509	8.08	.52	1.16	.099
[illegible]8	11	204930	13151	29534	2509	8.08	.52	1.16	.099
68	12	251285	19072	6321	613	179.19	13.60	4.51	.437
		16733819	235920	1201959	113844	19.86	.28	1.43	.135
69	1	1764293	33429	34649	1783	57.17	1.08	1.12	.058
69	2	6924	21589	21203	1158	.45	1.41	1.39	.076
69	3	1793100	39115	57479	2824	35.53	.77	1.14	.056
69	4	222886	13348	27772	1388	10.66	.64	1.33	.066
69	5	2206966	26515	73600	3418	37.43	.45	1.25	.058
69	6	4112259	51608	129889	5411	34.17	.43	1.08	.045
69	7	3595250	32320	141655	4112	51.86	.47	2.04	.059
69	8	1354422	23959	203371	24110	13.75	.24	2.06	.245
69	9	4387810	37387	75765	8699	59.31	.51	1.02	.118
69	10	1611998	19835	175677	35230	18.21	.22	1.98	.398
69	11	792821	10179	133314	11045	7.12	.09	1.20	.099
69	12	375605	14862	98625	13600	5.05	.20	1.33	.183
		22224334	324146	1172999	112778	27.34	.40	1.44	.139
[illegible]		22224334	324146	1172999	112778	27.34	.40	1.44	.139
70	1	1557836	42594	72283	3319	29.60	.81	1.37	.063
70	2	1636213	31886	55801	2631	38.56	.75	1.32	.062
70	3	1683082	58791	167812	7367	11.90	.42	1.19	.052
70	4	0	0	35333	1472	0.00	0.00	1.20	.050
70	5	759021	53941	66415	3409	16.18	1.15	1.42	.073
70	6	2438320	49179	102671	4403	25.20	.51	1.06	.046
70	7	1266287	18625	243221	6247	12.07	.18	2.32	.060
70	8	1430079	17156	35394	3868	48.44	.58	1.20	.131
70	9	999628	28397	46727	6234	22.20	.3	1.04	.138
70	10	483968	10517	124223	25322	7.77	.17	1.99	.496
70	11	0	6780	2665	264	0.00	7.19	2.83	.280
70	12	0	0	0	0	I	I	I	I
		12254434	317866	952544	64536	18.79	.49	1.46	.099

71	1	10408	749	243	23	95.75	6.89	2.24	.213
71	2	621[illegible]	3527	1176	110	86.65	4.92	1.64	.153
■1	2	62169	3527	1176	110	86.65	4.92	1.64	.153
71	3	0	0	0	0	I	I	I	I
71	4	0	0	0	0	I	I	I	I
71	5	2400701	33576	22028	1231	149.24	2.09	1.37	.077
71	6	1066145	20107	11484	708	130.81	2.47	1.41	.087
71	7	404045	13902	6643	467	101.69	3.50	1.67	.118
71	8	3058213	27928	15574	977	307.36	2.81	1.57	.098
71	9	4564930	33026	56284	5498	97.26	.70	1.20	.117
71	10	2707011	47531	95134	15252	53.47	.94	1.88	.301
71	11	1442656	14726	69192	5302	24.72	.25	1.19	.091
71	12	1361670	37542	25470	2176	96.93	2.67	1.81	.155
		17077950	232614	303227	31743	81.73	1.11	1.45	.152
72	1	1169935	24591	21108	1174	87.66	1.84	1.58	.088
72	2	3087218	22061	24659	1248	171.41	1.22	1.37	.069
72	3	715451	28556	19104	1053	56.67	2.26	1.51	.083
72	4	1842649	22149	39196	1927	60.15	.72	1.28	.063
■2	4	1842649	22149	39196	1927	60.15	.72	1.28	.063
72	5	2418680	27424	67667	3116	42.60	.48	1.19	.055
72	6	4724439	44188	109478	4605	49.73	.47	1.15	.048
72	7	1968522	37644	185973	5266	22.17	.42	2.09	.059
72	8	707135	18875	132276	15877	11.60	.31	2.17	.260
72	9	1353892	17779	51552	6970	32.41	.43	1.23	.167
72	10	747207	30957	55753	8931	21.42	.89	1.60	.256
72	11	1438473	30465	39789	2787	32.83	.70	.91	.064
72	12	523124	17136	33094	4316	21.11	.69	1.34	.174
		20696725	321825	779648	57268	39.69	.62	1.50	.110
73	1	910799	22294	23277	1279	55.89	1.37	1.43	.079
73	2	1329880	25462	13477	888	136.08	2.61	1.38	.091
73	3	442784	20101	15265	917	39.27	1.78	1.35	.081
73	4	73336	5819	1870	180	113.38	9.00	2.89	.279
73	5	450318	6653	3031	221	226.36	3.34	1.52	.111
73	6	2117509	31599	25693	1331	72.86	1.09	.88	.046
■3	6	2117509	31599	25693	1331	72.86	1.09	.88	.046
73	7	1644762	29005	222566	5970	16.42	.29	2.22	.060
73	8	3345718	50502	154089	16167	26.97	.41	1.24	.130
73	9	563782	12332	135934	19774	4.75	.10	1.15	.167
73	10	1466583	20128	74172	14153	31.04	.43	1.57	.300
73	11	686050	16630	74581	6208	11.00	.27	1.20	.100
73	12	281395	22314	20970	2329	16.51	1.31	1.23	.137
		13312915	262840	764925	69417	24.72	.49	1.42	.129
74	1	931399	29802	68957	2979	10.33	.33	.77	.033
74	2	0	0	11222	468	0.00	0.00	1.20	.050
74	3	143521	8775	3487	283	91.21	5.58	2.22	.180
74	4	282917	16245	5409	506	207.37	11.91	3.96	.371
74	5	535057	10696	5181	360	228.13	4.56	2.21	.154
74	6	2845668	29144	42505	1942	90.53	.93	1.35	.062
74	7	3825414	43303	139518	4263	61.72	.70	2.25	.069
74	8	1652502	23124	151602	17717	23.32	.33	2.14	.250
■4	8	1652502	23124	151602	17717	23.32	.33	2.14	.250
74	9	3209147	41645	42230	3740	106.35	1.38	1.40	.124
74	10	555490	40722	168821	29005	4.81	.35	1.46	.251
74	11	670430	42862	26064	1535	21.49	1.37	.84	.049
74	12	21639	5581	24662	3404	1.18	.30	1.35	.186
		14673185	291900	689658	66200	31.61	.63	1.49	.143

EXHIBIT 7-13: CLADM Quality Output for Western C-14 Using Planned Scenario.

PLAN SCENARIO LAND USES
HILLSBORO + C14

		TLSS	TLBOD	TLN	TLP	TCSS	TCBOD	TCN	TCP
63	1	0	102814	19244	2519	0.00	7.02	1.31	.172
63	2	53664	67530	32522	2495	1.08	1.36	.66	.050
63	2	53664	67530	32522	2495	1.08	1.36	.66	.050
63	3	72208	74252	11150	1716	3.05	3.14	.47	.072
63	4	4483	10987	1261	238	2.41	5.91	.68	.128
63	5	302959	76079	9627	1669	7.05	1.77	.22	.039
63	6	137698	60607	20071	1812	3.54	1.56	.52	.047
63	7	9139	55226	49564	2242	.45	2.73	2.45	.111
63	8	131301	66731	18325	2715	4.82	2.45	.67	.100
63	9	399893	70222	33376	5115	5.27	.93	.44	.067
63	10	129778	38445	100219	20712	1.65	.49	1.28	.264
63	11	25372	49002	24109	2602	1.02	1.97	.97	.105
63	12	65525	113528	14518	2664	3.50	6.06	.78	.142
		1332020	785423	333986	46499	3.19	1.88	.80	.111
64	1	44392	37882	69831	3354	.73	.62	1.15	.055
64	2	130528	72028	45076	3090	2.73	1.51	.94	.065
64	3	227929	58662	14984	1603	10.66	2.74	.70	.075
64	4	368737	90098	13654	2069	17.04	4.16	.63	.096
64	4	368737	90098	13654	2069	17.04	4.16	.63	.096
64	5	361224	53316	34618	2320	7.19	1.06	.69	.046
64	6	407763	65614	61075	3460	5.48	.88	.82	.047
64	7	243967	53598	21955	1542	9.53	2.09	.86	.060
64	8	473639	81604	78217	10031	7.14	1.23	1.18	.151
64	9	221710	59147	41126	6280	4.15	1.11	.77	.118
64	10	451966	72931	169834	34940	3.48	.56	1.31	.269
64	11	378	20744	57659	5058	.01	.44	1.22	.107
64	12	37401	98353	53795	8111	.90	2.38	1.30	.196
		2969634	763977	661825	81859	4.64	1.19	1.03	.128
65	1	6025	20736	3200	482	2.26	7.78	1.20	.181
65	2	170885	110539	26394	2959	4.88	3.15	.75	.084
65	3	7770	36160	12278	1123	.79	3.66	1.24	.114
65	4	6537	32612	3719	706	4.67	23.30	2.66	.505
65	5	5647	10406	1198	226	6.79	12.51	1.44	.271
65	6	635946	89549	18737	2235	11.62	1.64	.34	.041
65	6	635946	89549	18737	2235	11.62	1.64	.34	.041
65	7	326836	80028	139720	4881	3.45	.85	1.48	.052
65	8	41546	61190	105436	13339	.75	1.10	1.89	.240
65	9	61252	49040	43867	6702	1.29	1.03	.92	.141
65	10	269936	81184	226021	46735	1.07	.32	.89	.185
65	11	67148	42415	118663	10392	.60	.38	1.06	.093
65	12	21407	60732	28025	4279	1.09	3.08	1.42	.217
		1620935	674590	727258	94060	2.36	.98	1.06	.137
66	1	97340	85137	66736	4047	1.67	1.46	1.14	.069
66	2	300335	53901	55711	3214	4.34	.78	.81	.046
66	3	78860	44968	31544	2071	2.76	1.59	1.11	.073
66	4	50780	74474	9534	1654	7.32	10.73	1.37	.238
66	5	260711	86001	21618	2340	9.36	3.09	.78	.084
66	6	752694	62149	158236	7120	3.63	.30	.76	.034
66	7	59420	55664	480573	12648	.33	.31	2.67	.070
66	8	218356	55698	77102	9779	4.04	1.03	1.43	.181
66	8	218356	55698	77102	9779	4.04	1.03	1.43	.181
66	9	432822	66717	49983	7538	6.23	.96	.72	.109
66	10	375442	58424	263419	54501	2.42	.38	1.70	.352
66	11	10541	45140	37583	3681	.36	1.54	1.28	.125

	2640002	747494	1267875	111157	2.95	.83	1.42	.124
67 1	70636	85872	31902	2713	2.75	3.34	1.24	.106
67 2	115909	67713	24220	2148	5.06	2.96	1.06	.094
67 3	258794	75934	14207	1859	13.48	3.95	.74	.097
67 4	0	0	0	0	I	I	1	I
67 5	8202	5410	640	118	22.52	14.85	1.76	.323
67 6	1022356	79404	172100	7938	5.86	.46	.99	.046
67 7	123879	51796	189301	5545	1.63	.68	2.49	.073
67 8	306365	81806	111087	14103	4.29	1.14	1.55	.197
67 9	348497	59640	41595	6300	6.11	1.05	.73	.110
67 10	261154	44351	239723	49666	1.93	.33	1.77	.367
■7 10	261154	44351	239723	49666	1.93	.33	1.77	.367
67 11	170710	46181	15721	1839	6.94	1.88	.64	.075
67 12	36292	83953	23359	3748	2.15	4.97	1.38	.222
	2722794	682060	863857	95976	4.36	1.09	1.38	.154
68 1	35107	40313	7067	968	5.44	6.24	1.09	.150
68 2	69403	89340	15469	2153	4.94	6.35	1.10	.153
68 3	38135	40100	4673	871	6.22	6.54	.76	.142
68 4	0	0	0	0	I	I	I	I
68 5	404047	87855	122544	6567	2.76	.60	.84	.045
68 6	288560	34180	194521	8057	1.32	.16	.89	.037
68 7	54205	16838	299891	7553	.40	.13	2.23	.056
68 8	70156	105011	92680	12114	1.11	1.66	1.47	.192
68 9	392869	68221	72026	10825	3.51	.61	.64	.097
68 10	128104	35058	351877	73119	.66	.18	1.80	.374
68 11	15411	44945	30891	3120	.57	1.65	1.13	.114
68 12	18807	55755	6491	1223	9.03	26.78	3.12	.587
	1514804	617616	1198131	126570	1.64	.67	1.29	.137
■	1514804	617616	1198131	126570	1.64	.67	1.29	.137
69 1	319966	100520	33527	3015	8.29	2.60	.87	.078
69 2	172582	57562	18316	1726	9.85	3.29	1.05	.099
69 3	413573	90202	52086	3670	6.91	1.51	.87	.061
69 4	14021	39437	29969	1915	.58	1.64	1.24	.079
69 5	174376	83227	75548	4545	2.63	1.26	1.14	.069
69 6	930472	63854	107805	5199	6.81	.47	.79	.038
69 7	210245	80718	147822	5091	2.60	1.00	1.83	.063
69 8	132901	64138	209820	26081	1.24	.60	1.96	.243
69 9	408428	65487	68290	10254	4.55	.73	.76	.114
69 10	104939	52378	190317	39459	1.05	.52	1.90	.394
69 11	53577	31018	147509	12659	.43	.25	1.17	.101
69 12	25947	42009	109671	15652	.31	.50	1.31	.187
	2961027	770550	1190679	129267	3.18	.83	1.28	.139
70 1	341892	108630	59660	4165	6.17	1.96	1.08	.075
70 2	313286	62998	45618	2945	6.67	1.34	.97	.063
■0 2	313286	62998	45618	2945	6.67	1.34	.97	.063
70 3	714829	84093	134070	6963	4.84	.57	.91	.047
70 4	0	0	36185	1508	0.00	0.00	1.20	.050
70 5	498686	36709	51529	4429	10.49	.77	1.08	.093
70 6	825803	72997	87918	4599	7.24	.64	.77	.040
70 7	288058	27651	225481	5961	2.72	.26	2.13	.056
70 8	128160	51865	39466	5183	3.55	1.44	1.09	.144
70 9	87431	99158	51712	8097	1.64	1.86	.97	.152
70 10	41665	32283	134356	27886	.60	.47	1.95	.405
70 11	0	10727	1216	232	0.00	17.01	1.93	.368
70 12	0	28594	3242	619	0.00	37.18	4.22	.805
	3239810	615705	870452	72587	4.58	.87	1.23	.163

71 1	20[illegible]	69436	7930	1504	6.03	20.81	2.30	.451
71 2	25[illegible]	64139	7602	1401	5.00	12.56	1.49	.274
71 3	0	5879	667	127	0.00	26.38	2.99	.571
71 4	0	0	0	0	I	I	I	I
71 5	442474	99277	16445	2335	17.27	3.88	.64	.091
71 5	442474	99277	16445	2335	17.27	3.88	.64	.091
71 6	243955	81183	14060	1932	11.57	3.85	.67	.092
71 7	82072	42343	5072	923	13.07	6.74	.81	.147
71 8	102752	75673	17139	2623	10.78	4.46	1.01	.155
71 9	459655	36676	39320	5804	8.16	.65	.70	.103
71 10	295067	100043	82647	16831	5.14	1.74	1.44	.293
71 11	151211	13901	57998	4973	2.53	.23	.97	.083
71 12	181869	100921	20817	3431	10.25	5.69	1.17	.193
	2084734	689471	269706	41884	7.73	2.56	1.00	.155
72 1	116683	68206	18283	1878	7.13	4.17	1.12	.115
72 2	178115	46529	20356	1625	7.63	1.99	.87	.070
72 3	577686	93387	12497	2063	24.27	3.92	.52	.087
72 4	134360	58473	35953	2478	3.99	1.74	1.07	.074
72 5	241145	63804	63817	3721	3.68	.97	.97	.057
72 6	674607	65005	96177	4788	6.01	.58	.86	.043
72 7	396459	72848	184573	5828	3.83	.72	1.83	.058
72 7	396459	72848	184573	5828	3.83	.72	1.83	.058
72 8	37383	59069	144401	18083	.54	.85	2.09	.261
72 9	78234	51534	49240	7502	1.80	1.19	1.13	.173
72 10	242217	67460	51227	10384	5.93	1.65	1.26	.254
72 11	272176	70183	34853	3705	5.15	1.33	.66	.070
72 12	24036	57286	35738	5342	.86	2.04	1.27	.190
	2963101	773784	747115	67397	4.86	1.27	1.22	.110
73 1	48252	71625	22535	2106	2.76	4.10	1.29	.120
73 2	121977	76977	15692	1948	6.99	4.41	.90	.112
73 3	69132	58817	15269	1626	4.56	3.88	1.01	.107
73 4	4183	30842	3511	667	1.91	14.06	1.60	.304
73 5	50306	58468	6796	1270	7.43	8.63	1.00	.188
73 6	208906	60227	22015	1876	4.91	1.42	.52	.044
73 7	251536	53129	212618	6133	2.34	.49	1.98	.057
73 8	652462	81476	167222	20844	4.25	.53	1.09	.136
73 9	30002	37715	152815	22777	.22	.27	1.11	.166
73 9	30002	37715	152815	22777	.22	.27	1.11	.166
73 10	80993	55254	78752	16237	1.46	1.00	1.42	.293
73 11	34184	57531	83476	7651	.47	.80	1.16	.106
73 12	66747	72904	22248	3517	3.19	3.49	1.06	.168
	1618680	714965	802948	86652	2.50	1.10	1.24	.134
74 1	267058	53800	66727	3497	2.51	.51	.63	.033
74 2	0	0	11705	488	0.00	0.00	1.20	.050
74 3	69152	10496	7556	1404	16.75	2.54	1.83	.340
74 4	4695	19860	2267	430	5.30	22.42	2.56	.485
74 5	114059	69772	8288	1519	17.81	10.89	1.29	.237
74 6	365051	56147	34805	2293	9.21	1.42	.88	.058
74 7	522145	80610	137516	4838	7.05	1.09	1.86	.065
74 8	205817	59972	154014	19208	2.66	.78	1.99	.248
74 9	512474	84597	30764	4750	13.53	2.23	.81	.125
74 10	898670	24098	148250	30268	7.01	.19	1.16	.236
74 11	339523	96660	24690	3168	7.06	2.01	.51	.066
74 11	339523	96660	24690	3168	7.06	2.01	.51	.066
74 12	0	16297	27267	3927	0.00	.78	1.31	.189
	3298643	572309	653849	75791	5.96	1.03	1.18	.137

Exhibit 7.14: Computer Program for the Discharge Model

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MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM
MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM


                        PROGRAM DISCHAR(LAND,TAPE1=LAND,SCENAR,
                     *  TAPE2=SCENAR,CARDS,TAPE3=CARDS,OUTPUT
                     *  ,DISCHAR,TAPE4=DISCHAR)
000003                  DIMENSION DISH(12),SWETH(12),SWETF(12)

              *READ ITITLE FROM LAND SCENARIO FILE AND SKIP TO
||            *READ ITITLE FROM LAND SCENARIO FILE AND SKIP TO
              *DATA

000003                 DISFNS=0.
000004                  READ(1,1000) ITITLEL
000012                  READ(2,1000) ITITLES
000020        1000      FORMAT(1X,A7////////)

              *PRINT TITLE

000020                 WRITE(4,1070)
000024        1070     FORMAT(26X,*73-74 LAND USES*,33X,1H*,15X,
                     * *SCENARIO LAND USES*)
000024                 WRITE(4,1060)
000030        1060     FORMAT(9X,*RAINFALL*,2X,*DISCHARGE*,5X,*RUNOFF*,7X,
                     * *SWET*,7X,*DSET*,7X,*NGWL*,7X,*NGWL*,5X,*RUNOFF*,
                     * 7X,*DSET*,7X,*SWET*,2X,*DISCHARGE*)
              *READ SURFACE WATER DATA HISTORICAL AND FUTURE

000030                  READ(3,1004)ISWHT,IDUM,(SWETH(I),I=1,12)
000046                  READ(3,1004) ISWFT,IDUM,(SWETF(I),I=1,12)

              *READ IFI CONSTANT
              *CHECK TITLE ON ALL INPUT DATA. WILL INSURE ALL
              *DATA IS FOR THE SAME STRUCTURE.

||
000064                 IF(ITITLEL.EQ.ITITLES.AND.ITITLES.EQ.ISWHT.AND.
                     * ISWHT.EQ.ISWFT)05,9010
000101        05       CONTINUE

000101                  READ(3,1020) XIFI
000107        1020      FORMAT(F6.3)
000107        10        CONTINUE

              *READ DISCHARGE DATA

000107                  READ(3,1004) IDISHT,IYRDISH,(DISH(I),I=1,12)
000125        1004      FORMAT(A7,X,I2,7(F10.2)/10X,5(F10.2))
000125                  IF(EOF,3) 9999,20
000130        20        CONTINUE

              *CHECK TITLE ON ALL INPUT DATA. WILL INSURE ALL
              *DATA FROM SAME STRUCTURE.

000130                 IF(IDISHT.NE.ITITLEL)GO TO 9010

              *DO CALCULATIONS FOR EVERY 12 MONTHS OF YEAR
```

```
000132               DO 60 I=1,12

              *READ HISTORICAL DATA


000134               READ(1,1030)IYRH,IMOH,RAINH,RFH,DSETH
              *READ FUTURE DATA
‖             *READ FUTURE DATA
000151               READ(2,1030)IYRF,IMOF,RAINF,RFF,DSETF
000167        1030   FORMAT(1X,I2,X,I2,80X,3(2X,F9.0))
000167               IF(IYRH.EQ.IYRF.AND.IMOH.EQ.IMOF)25,9020
000200        25     CONTINUE
000200               IF(IYRH.NE.IYRDISH)GO TO 9030
000202               XNGWLH=RAINH-DISH(I)-DSETH-SWETH(I)
000206               IF(XNGWLH)30,30,40
000210        30     CONTINUE
000210               XNGWLF=XNGWLH*(1+XIFI)
000214               GO TO 50
000214        40     CONTINUE
000214               XNGWLF=XNGWLH/(1.+XIFI)
000217        50     CONTINUE
000217               DISF=RAINH-XNGWLF-DSETF-SWETF(I)+DISFNS
000224               IF(DISF)52,54,54
000226        52    CONTINUE
000226               DISFNS=DISF
000227              DISF=0.
000230              GO TO 56
000231        54    DISFNS=0.
000232        56    CONTINUE
000232               YRAINH=YRAINH+RAINH
000234               YDISH=YDISH+DISH(I)
000236               YRRFH=YRRFH+RFH
‖00236               YRRFH=YRRFH+RFH
000240               YRSWETH=YRSWETH+SWETH(I)
000242               YRDSETH=YRDSETH+DSETH
000244               YRXNGH=YRXNGH+XNGWLH
000246               YRXNGF=YRXNGF+XNGWLF
000250               YRRFF=YRRFF+RFF
000252               YRDSETF=YRDSETF+DSETF
000254               YRSWETF=YRSWETF+SWETF(I)
000256               YRDISF=YRDISF+DISF
000260               WRITE(4,2000)IYRH,IMOH,RAINH,DISH(I),RFH,SWETH(I),
                   * DSETH,XNGWLH,XNGWLF,RFF,DSETF,SWETF(I),DISF
000315        2000   FORMAT(X,I2,X,I2,11(2X,F9.0))
000315        60     CONTINUE
000317               WRITE(4,2010)YRAINH,YDISH,YRRFH,YRSWETH,YRDSETH,YRXNGH,
                   * YRXNGF,YRRFF,YRDSETF,YRSWETF,YRDISF
000351        2010   FORMAT(6X,11(2X,F9.0)/)
000351               YRAINH=YDISH=YRRFH=YRSWETH=YRDSETH=YRXNGH=YRXNGF=0.
000360               YRRFF=YRDSETF=YRSWETF=YRDISF=0.
000364               READ(1,1050)
000367               READ(2,1050)
000373        1050   FORMAT(X,/)
000373               GO TO 10
‖00373               GO TO 10

              *ERROR MESSAGES

000374        9010   CONTINUE
000374               WRITE(4,9011)
000400        9011   FORMAT(* STRUCTURE ID DO NOT MATCH*/
                   * *CHECK ID ON ALL INPUT DATA*)
000400               STOP1
000402        9020   CONTINUE
000402               WRITE(4,9021)
000406        9021   FORMAT(* YEARS AND/OR MONTH  DO NOT MATCH ON INPUT DATA*
```

```
                  * * CHECK DATA FILES(LAND AND SCENARIO)*)
000406              STOP2
000410     9030     CONTINUE
000410              WRITE(4,9031)
000414     9031     FORMAT(* HISTORICAL DISCHARGE NOT IN SEQUENCE.*/
                  * * WITH INPUT FILES. CHECK YEAR SEQUENCE OF HISTORICAL*/
                  * * DISCHARGE.*)
000414              STOP3
000416     9999     STOP
000420              END
```

CROSS REFERENCE MAP-DISCHAR

PROGRAM LENGTH INCLUDING I/O BUFFERS
013052

STATEMENT FUNCTION REFERENCES

```
          LOCATION   GEN TAG    SYM TAG    REFERENCES
```


```
‖         LOCATION   GEN TAG    SYM TAG    REFERENCES
```


STATEMENT NUMBER REFERENCES

```
          LOCATION   GEN TAG    SYM TAG    REFERENCES
          000101     L00037     5          000077
          000107     L00042     10         000373
          000130     L00051     20         NONE
          000200     L00070     25         000177
          000210     L00074     30         000207
          000214     L00076     40         000207
          000217     L00077     50         000213
          000226     L00101     52         NONE
          000231     L00104     54         000225
          000232     L00105     56         000230
          000441     C00017     1000       000004     000012
          000504     C00062     1004       000030     000046     000107
          000502     C00060     1020       000101
          000511     C00067     1030       000133     000151
          000525     C00103     1050       000363     000367
          000457     C00035     1060       000024
          000445     C00023     1070       000020
          000516     C00074     2000       000257
          000522     C00100     2010       000317
          000374     L00140     9010       000100     000131
          000527     C00105     9011       000374
          000402     L00145     9020       000177
```


```
‖         000402     L00145     9020       000177
```


```
          000543     C00121     9021       000402
          000410     L00152     9030       000201
          000560     C00136     9031       000410
          000416     L00157     9999       000127
```

BLOCK NAMES AND LENGTHS

VARIABLE REFERENCES

```
          LOCATION   GEN TAG    SYM TAG    REFERENCES
          000704     V00032     DISF       000224     000226     000256     0003
          000656     V00004     DISFNS     000003     000222     000227     0002
          000612     A00001     DISH       NONE
          000701     V00027     DSETF      000164     000221     000252     0003
          000674     V00022     DSETH      000146     000204     000242     0002
          000663     V00011     I          000040     000043     000056     000
                                           000133     000202     000217     0002
```

EXHIBIT 7.12: CLADM Quality Output for Western C-14 Using 1973-74 Land Uses

```
                                         000274    000310    000315
           000666    V00014    IDISHT    000112    000130
           000662    V00010    IDUM      000035    000053
           000676    V00024    IMOF      000156    000173
           000671    V00017    IMOH      000140    000172    000264

           000664    V00012    ISWFT     000051    000073
    ‖      000664    V00012    ISWFT     000051    000073
           000661    V00007    ISWHT     000033    000070
           000657    V00005    ITITLEL   000007    000064    000130
           000660    V00006    ITITLES   000015    000064
           000667    V00015    IYRDISH   000114    000200
           000675    V00023    IYRF      000154    000167
           000670    V00016    IYRH      000136    000167    000200    00026
           000677    V00025    RAINF     000160
           000672    V00020    RAINH     000142    000203    000220    00023
           000700    V00026    RFF       000162    000250    000304
           000673    V00021    RFH       000144    000236    000272
           000642    A00003    SWETF     NONE
           000626    A00002    SWETH     NONE
           000665    V00013    XIFI      000104    000211    000214
           000703    V00031    XNGWLF    000213    000216    000220    00024
           000702    V00030    XNGWLH    000206    000212    000215    00024
           000706    V00034    YDISH     000235    000324    000356
           000705    V00033    YRAINH    000232    000322    000357
    ‖      000705    V00033    YRAINH    000232    000322    000357
           000717    V00045    YRDISF    000255    000346    000360
           000715    V00043    YRDSETF   000251    000342    000362
           000711    V00037    YRDSETH   000241    000332    000353
           000714    V00042    YRRFF     000247    000340    000363
           000707    V00035    YRRFH     000236    000326    000355
           000716    V00044    YRSWETF   000254    000344    000361
           000710    V00036    YRSWETH   000240    000330    000354
           000713    V00041    YRXNGF    000245    000336    000351
           000712    V00040    YRXNGH    000243    000334    000352

START OF CONSTANTS
000422

START OF TEMPORARIES
000602

START OF INDIRECTS
000607

UNUSED COMPILER SPACE
011200


                  SUBROUTINE CHANGE(ARRAY)
000003            DIMENSION ARRAY(12)
000003            DO 10 I=1,12
000005            ARRAY(I)=(ARRAY(I)*(74850.))/12.
000010    10      CONTINUE
000012            RETURN
000012            END


CROSS REFERENCE MAP-CHANGE
‖ROSS REFERENCE MAP-CHANGE

SUBPROGRAM LENGTH
000025

STATEMENT FUNCTION REFERENCES
```

```
          LOCATION  GEN TAG   SYM TAG   REFERENCES

STATEMENT NUMBER REFERENCES

          LOCATION  GEN TAG   SYM TAG   REFERENCES

BLOCK NAMES AND LENGTHS

VARIABLE REFERENCES

          LOCATION  GEN TAG   SYM TAG   REFERENCES
          000024    V00002    I         000004

START OF CONSTANTS
000014

START OF TEMPORARIES
000017

START OF INDIRECTS
000023

UNUSED COMPILER SPACE
013400
‖13400

AJYQJLH.  17.46.42. 77/02/16.




*************************************
*************************************

 THIS IS   D I S P O S E D   OUTPUT.

 IT  WILL  NOT  HAVE  A  CARD  DECK.

 PLEASE PUT OUT FOR USER     9364003

*************************************
*************************************



‖
```

Exhibit 7.15: Computer Program for the Quality Computations

```
RPMQUA T=00004 IS ON CR00002 USING 00023 BLKS R=0197

RPM,T10,CM50000. MCGRAW-FOY
ACCOUNT,
CBR,,QUALITY.
R,QUALITY.
RUN,S,,,QUALITY,LOOK,QUALITB.
RP,QUALITY,QUALITB.
DISPOSE,LOOK=PR/EI=9364003.
$D
      PROGRAM QUALITY(SCENAR,TAPE1=SCENAR,SCENARU,TAPE3=SCENARU,
     * LAND,TAPE2=LAND,
     * DISCHAR,TAPE4=DISCHAR,CARD2,TAPE5=CARD2,ONPS,TAPE10=ONPS
     * ,TLTC,TAPE11=TLTC,RLSSRLU,TAPE13=RLSSRLU,OUTPUT)
      DIMENSION ONPSCS(12),ONPSCB(12),ONPSCN(12),ONPSCP(12)

*READ INPUT CARDS

      CALL READIT(ONPSCS)
      CALL READIT(ONPSCB)
      CALL READIT(ONPSCN)
      CALL READIT(ONPSCP)

      READ(5,8001)REFFSS,REFBOD,REFFN,REFFP
8001  FORMAT(10X,4(F10.2))

*SKIP HEADER ON INPUT FILES

      CALL SKHEAD

*PRINT HEADER ON OUTPUT FILES

      CALL HEADER
10    CONTINUE

      DO 20 I=1,12

*READ FUTURE DISCHARGE FROM FILE

       READ(4,8000)IDATE1,DISF
8000   FORMAT(X,R5,10(11X),2X,F9.0)

      IF(EOF,4)9999,25
25    CONTINUE

*READ SUMMARY DATA NONURBAN

      READ(1,8010)IDATE2,RLSS,RLBOD,RLN,RLP,SRQN
8010  FORMAT(X,R5,3X,2(11X),4(2X,F9.0),2(11X),2X,F9.0)

*READ DATA LAND

      READ(2,8010)IDATE4,RLLSS,RLLBOD,RLLN,RLLP,SRLQN

*READ SUMMARY DATA URBAN
      READ(3,8010)IDATE3,RLUSS,RLUBOD,RLUN,RLUP,SRUQN
*CHECK MONTH AND YEAR ON THE THREE INPUT FILES
      IF(IDATE1.NE.IDATE2.OR.IDATE2.NE.IDATE3
     * .OR.IDATE3.NE.IDATE4) GO TO 9000

*START CALCULATIONS'FOR EACH MONTH

```

```
      STOP
      END
      SUBROUTINE HEADER
      WRITE(10,8000)
 8000 FORMAT(12X,*ONPSLS*,6X,*ONPSLB*,6X,*ONPSLN*,6X,*ONPSLP*,
     * 5X,*ONPSCSY*,5X,*ONPSCBY*,5X,*ONPSCNY*,5X,*ONPSCPY*
     * ,6X,*ONPSQN*)
      WRITE(11,8010)
 8010 FORMAT(14X,*TLSS*,7X,*TLBOD*,9X,*TLN*,9X,*TLP*,8X,
     * *TCSS*,7X,*TCBOD*,9X,*TCN*,9X,*TCP*)
      WRITE(13,8030)
 8030 FORMAT(12X,*RLSS/SR*,2X,*RLBOD/SR*,4X,*RLN/SR*,4X,*RLP/S
     * 2X,*RLUSS/SR*,1X,*RLUBOD/SR*,3X,*RLUN/SR*,3X,*RLUP/SR*
     * ,2X,*RLLSS/SR*,1X,*RLLBOD/SR*,3X,*RLLN*,3X,*RLLP*)
      RETURN
      END
      SUBROUTINE READIT(ARRAY)
      DIMENSION ARRAY(12)
      READ(5,8000) ARRAY
 8000 FORMAT(10X,7(F10.3)/10X,5(F10.3))
      RETURN
      END
      SUBROUTINE SKIPIT
      READ(4,8010)IDUM
      READ(2,8010) IDUM
      READ(1,8010)IDUM
      READ(3,8010)IDUM
 8010 FORMAT(A10)
      RETURN
      END
      SUBROUTINE SKHEAD
      READ(1,8000)
      READ(2,8000)
      READ(3,8000)
 8000 FORMAT(/////////)
      READ(4,8010)
 8010 FORMAT(/)
      RETURN
      END
 $E
```

```
      ONPSCBY=SUMSLB/YYYSQN
      ONPSCNY=SUMSLN/YYYSQN
      ONPSCPY=SUMSLP/YYYSQN

      WRITE(10,8040)IDATE1,SUMSLS,SUMSLB,SUMSLN,SUMSLP,
     * ONPSCSY,ONPSCBY,ONPSCNY,ONPSCPY,SUMSQN
*READ YEARLY FUTURE DISCHARGE
      READ(4,8000)IDUM,DISCHYR

      ZZZDIS=DISCHYR*2.71778
      YRTCSS=SUMTLSS/ZZZDIS
      YRTCBOD=SUMTLBO/ZZZDIS
      YRTCN=SUMTLN/ZZZDIS
      YRTCP=SUMTLP/ZZZDIS

      WRITE(11,8040)IDATE1,SUMTLSS,SUMTLBO,SUMTLN,SUMTLP,
     * YRTCSS,YRTCBOD,YRTCN,YRTCP
      READ(1,8010)IDUM,RLSS,RLBOD,RLN,RLP,SRQN
      READ(3,8010)IDUM,RLUSS,RLUBOD,RLUN,RLUP,SRUQN
      READ(2,8010)IDUM,RLLSS,RLLBOD,RLLN,RLLP,SRLQN

      AAASRQN=SRQN*2.71778

      XRLSS=RLSS/AAASRQN
      XRLBOD=RLBOD/AAASRQN
      XRLN=RLN/AAASRQN
      XRLP=RLP/AAASRQN

      AAASRQN=SRUQN*2.71778

      XRLUSS=RLUSS/AAASRQN
      XRLUBOD=RLUBOD/AAASRQN
      XRLUN=RLUN/AAASRQN
      XRLUP=RLUP/AAASRQN

      AAASRQN=SRLQN*2.71778

      XRLLSS=RLLSS/AAASRQN
      XRLLBOD=RLLBOD/AAASRQN
      XRLLN=RLLN/AAASRQN
      XRLLP=RLLP/AAASRQN

      WRITE(13,8030)IDATE1,XRLSS,XRLBOD,XRLN,XRLP,
     * XRLUSS,XRLUBOD,XRLUN,XRLUP,XRLLS,XRLLBOD,XRLLN,XRLLP

      WRITE(10,8060)
      WRITE(11,8060)
      WRITE(13,8060)
8060  FORMAT(/)
*SKIP BETWEEN YEARLY DATA ON INPUT FILES

      CALL SKIPIT

*ZERO DATA

      SUMSQN=SUMSLS=SUMSLB=SUMSLN=SUMSLP=0.
      SUMTLSS=SUMTLBO=SUMTLN=SUMTLP=0.

      GO TO 10

*ERROR MESSAGES
9000  CONTINUE
      PRINT 9001
9001  FORMAT(* DATES ON INPUT FILES DO NOTT MATCH*)
      CALL ABORT
9999  CONTINUE
```

```
      ONPSQN=DISF-SRQN
      IF(ONPSQN.LT.0.) ONPSQN=0.0
      XXXSQN=ONPSQN*2.71778
      SUMSQN=SUMSQN+ONPSQN
      ONPSLS=ONPSCS(I)*XXXSQN
      SUMSLS=SUMSLS+ONPSLS
      ONPSLB=ONPSCB(I)*XXXSQN
      SUMSLB=SUMSLB+ONPSLB
      ONPSLN=ONPSCN(I)*XXXSQN
      SUMSLN=SUMSLN+ONPSLN
      ONPSLP=ONPSCP(I)*XXXSQN
      SUMSLP=SUMSLP+ONPSLP
      TLSS=ONPSLS+RLSS-REFFSS*RLUSS
      SUMTLSS=SUMTLSS+TLSS
      TLBOD=ONPSLB+RLBOD-REFBOD*RLUBOD
      SUMTLBO=SUMTLBO+TLBOD
      TLN=ONPSLN+RLN-REFFN*RLUN
      SUMTLN=SUMTLN+TLN
      TLP=ONPSLP+RLP-REFFP*RLUP
      SUMTLP=SUMTLP+TLP
      XXXCON=DISF*2.71778
      TCSS=TLSS/XXXCON
      TCBOD=TLBOD/XXXCON
      TCN=TLN/XXXCON
      TCP=TLP/XXXCON
      AAASRQN=SRQN*2.71778
      XRLSS=RLSS/AAASRQN
      XRLBOD=RLBOD/AAASRQN
      XRLN=RLN/AAASRQN
      XRLP=RLP/AAASRQN
      AAASRQN=SRUQN*2.71778
      XRLUSS=RLUSS/AAASRQN
      XRLUBOD=RLUBOD/AAASRQN
      XRLUN=RLUN/AAASRQN
      XRLUP=RLUP/AAASRQN
      AAASRQN=SRLQN*2.71778
      XRLLSS=RLLSS/AAASRQN
      XRLLBOD=RLLBOD/AAASRQN
      XRLLN=RLLN/AAASRQN
      XRLLP=RLLP/AAASRQN
      WRITE(10,8020)IDATE1,ONPSLS,ONPSLB,ONPSLN,ONPSLP
     * ,ONPSQN
 8020 FORMAT(X,R5,4(X,F11.0),48X,X,F11.0)
      WRITE(11,8040)IDATE1,TLSS,TLBOD,TLN,TLP,TCSS,TCBOD,TCN,T
 8040 FORMAT(X,R5,4(X,F11.0),3(X,F11.2),X,F11.3,X,F11.0)
 8030 FORMAT(X,R5,3(X,F9.2),X,F9.3,3(X,F9.2),X,F9.3
     * ,3(X,F9.2),X,F9.3)
      WRITE(13,8030)IDATE1,XRLSS,XRLBOD,XRLN,XRLP,XRLUSS,XRLUB
     * XRLUN,XRLUP,XRLLSS,XRLLBOD,XRLLN,XRLLP
 20   CONTINUE
*CALCULATE YEARLY DATA
      IDATE1=5R
      YYYSQN=SUMSQN*2.71778
      ONPSCSY=SUMSLS/YYYSQN
```

Exhibit 7.16: Computer Program for the Summary Output

MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM
MWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMW
WMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWMWM

```
                          PROGRAM SUMM(OUTPUT,QUAL,TAPE1=QUAL,OUT,TAPE4=OUT
                         *,QUALSUM,TAPE2=QUALSUM)
000003                    COMMON/TOT/ TRF,ITSUSP,ITBOD,ITN,ITPO4
‖00003                    COMMON/TOT/ TRF,ITSUSP,ITBOD,ITN,ITPO4
000003                    COMMON/CONSTA/AREA,RFCOEFF,AREAN,CN,CONST
000003                    COMMON/ARRY/ TRAIN(25,12),YRRAIN(25)
000003                    DATA AREA,RFCOEFF,AREAN,CN,CONST/5*0./
000003                    DATA(TRAIN(I),I=1,300 )/300*0./
000003                    DATA(YRRAIN( I),I=1,25)/25*0./
000003                    DIMENSION IHOLD(132)
000003                    DATA IOLDMO/0/
000003                    DATA TRF,ITSUSP,ITBOD,ITN,ITPO4/1*0.,4*0/
000003                    CALL GETCOEF
000004     10             CONTINUE
000004                    CALL BLANKIT(IHOLD)
000006                    READ(1,1000) IHOLD
000014     1000           FORMAT(132R1)
000014                    IF(EOF,1)9999,11
000017     11             CONTINUE
000017                    IF(IHOLD(2).EQ.1R*.AND.IHOLD(3).EQ.1R*)GO TO 20
000030     15             CONTINUE

000030                    GO TO 10
000031     20             CONTINUE

000031                    CALL BLANKIT(IHOLD)
000033                    READ(1,1000) IHOLD
000041                    IF(EOF,1)9999,25
‖00041                    IF(EOF,1)9999,25
000044     25             CONTINUE
000044                    IF(IHOLD(2).EQ.1R .AND.IHOLD(6).EQ.1R1)30,20
000055     30             CONTINUE
000055                    ENCODE(2,1030,IMO)(IHOLD(J),J=11,12)
000071     1030           FORMAT(2R1)
000071                    DECODE(2,1040,IMO)MONTH
000101     1040           FORMAT(I2)
000101                    ENCODE(5,2000,JYRMODY)(IHOLD(J),J=8,12)
000115                    DECODE(5,2010,JYRMODY)IYRMODY
000125     2010           FORMAT(R5)
000125     2000           FORMAT(5R1)
000125                    IF(IOLDMO.EQ.0) IOLDMO=MONTH
000127                    IF(MONTH.NE.IOLDMO
                         * )CALL PRINTIT(MONTH,IOLDMO
                         * ,IOLDYMD)
000133                    ENCODE(5,1060,IRUNOFF)(IHOLD(J),J=26,30)
000147     1060           FORMAT(5R1)
000147                    DECODE(5,1062,IRUNOFF)RUNOFF
000157     1062           FORMAT(F5.2)
000157                    TRF=TRF+RUNOFF
000161                    ENCODE(6,1064,ISUSP)(IHOLD(J),J=32,37)
000175     1064           FORMAT(6R1)
‖00175     1064           FORMAT(6R1)
```

```
000175            DECODE(6,1066,ISUSP)INSUSP
000205   1066     FORMAT(I6)
000205            ITSUSP=ITSUSP+INSUSP
000207            ENCODE(5,1060,IBOD)(IHOLD(J),J=45,49)
000222            DECODE(5,1072,IBOD)INBOD
000232            ITBOD=ITBOD+INBOD
000234   1072      FORMAT(I5)
000234            ENCODE(5,1060,IN)(IHOLD(J),J=51,55)

000247            DECODE(5,1072,IN)N

000257            ITN=ITN+N
000261            ENCODE(5,1060,IP04)(IHOLD(J),J=56,60)
000274            DECODE(5,1072,IP04)NP04
000304            ITP04=ITP04+NP04

000306            CALL BLANKIT(IHOLD)
000307            IOLDYMD=IYRMODY
000311            READ(1,1000) IHOLD
000316            IF(EOF,1)9999,35
000321   35       CONTINUE
000321            IF(IHOLD(6).EQ.1R ) GO TO  38
000323            GO TO 30
000324   38       CONTINUE

000324            IF(IHOLD(2).EQ.1RP.AND.IHOLD(3).EQ.
                * 1RA) 40,45
000335   40       CONTINUE
000335   40       CONTINUE

000335            CALL SKIPIT(IHOLD)
000337            GO TO 30
000340   45       CONTINUE

000340             MONTH=1
000341            CALL PRINTIT(MONTH,IOLDMO,IOLDYMD)
000344   9999     STOP
000346            END


SUMM

PROGRAM LENGTH INCLUDING I/O BUFFERS
010771

UNUSED COMPILER SPACE
010300


                  SUBROUTINE SKIPIT(IHOLD)
000003            DIMENSION IHOLD(132)
000003   10       CONTINUE

000003   1000     FORMAT(132R1)
000003            CALL BLANKIT(IHOLD)
000004            READ(1,1000) IHOLD
000014            IF(EOF,1)20,15
000020   15       CONTINUE
000020            IF(IHOLD(12).GE.1R0.AND.IHOLD(12).LE.1R9)RETURN
000033            GO TO 10
```

```
000034   20      RETURN
000035           END


SKIPIT

SUBPROGRAM LENGTH
000055

UNUSED COMPILER SPACE
013300


                 SUBROUTINE BLANKIT(IHOLD)
000003           DIMENSION IHOLD(132)
‖00003           DIMENSION IHOLD(132)
000003           DO 10 I=1,132
000005           IHOLD(I)=1OR
000007   10      CONTINUE
000011            RETURN
000011           END


BLANKIT

SUBPROGRAM LENGTH
000022

UNUSED COMPILER SPACE
013400


                 SUBROUTINE PRINTIT(MONTH,IOLDMO,IOLDYMD)
000006           COMMON/TOT/ TRF,ITSUSP,ITBOD,ITN,ITPO4
000006           COMMON/CONSTA/AREA,RFCOEFF,AREAN,CN,CONST
000006           COMMON/ARRY/ TRAIN(25,12),YRRAIN(25)
000006           DATA IXYEAR,JOLDMO/1,1/
000006           DATA IZERO,ZERO/0,.0/
000006           YRRF=YRRF+TRF
000010           IYRSUSP=IYRSUSP+ITSUSP
000011           IYRBOD=IYRBOD+ITBOD
000013           IYRN=IYRN+ITN
000014           IYRPO4=IYRPO4+ITPO4
000016           XRAINF=TRAIN(IXYEAR,IOLDMO)
000022           RAINAF=ACFT(XRAINF)
000024           RFAF=ACFT(TRF)
000026           DSET=TRAIN(IXYEAR,IOLDMO)-(TRF /CONST)
000036           DSETAF=ACFT(DSET)
‖00036           DSETAF=ACFT(DSET)
000041           YRDSET=YRDSET+DSET
000043           YRDSAF=YRDSAF+DSETAF
000045           YRAINAF=YRAINAF+RAINAF
000047           YRFAF=YRFAF+RFAF
000051           IF(JOLDMO.LT.IOLDMO)12,16
000057   12      CONTINUE
000057           LCOUNT=IOLDMO-JOLDMO
000061           DO 14 IXI=1,LCOUNT
000062           ENCODE(10,1040,IYM)IOLDYMD,IXI
```

```
000073              RAINAF2=0.
000074              RAINAF2=ACFT(TRAIN(IXYEAR,IXI))
000102              YRAINAF=YRAINAF+RAINAF2
000103              WRITE(2,1020)IYM,TRAIN(IXYEAR,IXI),ZERO,IZERO,IZERO
                  * ,IZERO,IZERO,ZERO,RAINAF2,ZERO,ZERO
000140    14        CONTINUE
000145    16       CONTINUE
000145              WRITE(2,1020)IOLDYMD,TRAIN(IXYEAR,IOLDMO),TRF,ITSUSP,ITBO
                  * ,ITN,ITP04,DSET,RAINAF,RFAF,DSETAF
000203    1020      FORMAT(X,R5,3X,2(2X,F9.2),4(2X,I9),2X,F9.2,3(2X,F9.0))
000203              TRF=ITSUSP=ITBOD=ITN=ITP04=DSET=RAINAF=RFAF=DSETAF=0
‖00203              TRF=ITSUSP=ITBOD=ITN=ITP04=DSET=RAINAF=RFAF=DSETAF=0
000215    05        CONTINUE
000215              IF(IOLDMO.GT.MONTH)GO TO 20
000222              IF(MONTH.EQ.IOLDMO+1) GO TO 10
000224              IOLDMO=IOLDMO+1
000225              ENCODE(10,1040,IOLDYMD)IOLDYMD,IOLDMO
000236    1040      FORMAT(A8,I2)
000236              RAINAF2=0.
000237              RAINAF2=ACFT(TRAIN(IXYEAR,IOLDMO))
000251              YRAINAF=YRAINAF+RAINAF2
000252    C
000253              WRITE(2,1020)IOLDYMD,TRAIN(IXYEAR,IOLDMO),TRF,
                  * ITSUSP,ITBOD,ITN,ITP04,DSET,RAINAF2,RFAF,DSETAF
000311              GO TO 05
000314    10        CONTINUE
000314              JOLDMO=MONTH
000315              IOLDMO=MONTH
000316              RETURN
000316    20        CONTINUE
000316              IF(IOLDMO.EQ.12) GO TO 25
000320              IOLDMO=IOLDMO+1
000321              ENCODE(10,1040,IOLDYMD)IOLDYMD,IOLDMO

000333              WRITE(2,1020)IOLDYMD,TRAIN(IXYEAR,IOLDMO),TRF,
                  * ITSUSP,ITBOD,ITN,ITP04,DSET,RAINAF,RFAF,DSETAF
‖                 * ITSUSP,ITBOD,ITN,ITP04,DSET,RAINAF,RFAF,DSETAF
000373              GO TO 20
000376    25        CONTINUE
000376              WRITE(2,1010)YRRAIN(IXYEAR),YRRF,IYRSUSP,IYRBOD,IYRN,IYR
                  *,YRDSET,YRAINAF,YRFAF,YRDSAF
000426    1010      FORMAT(1X,*     *,3X,2(2X,F9.2),4(2X,I9),2X,F9.2,3(2X,F9
000426              IXYEAR=IXYEAR+1
000430              JOLDMO=1
000431              IOLDMO=MONTH
000433              YRRF=IYRSUSP=IYRBOD=IYRN=IYRP04=0
000440               YRDSET=YRDSAF=YRAINAF=YRFAF=0.
000444              RETURN
000445              END


PRINTIT

SUBPROGRAM LENGTH
000532

UNUSED COMPILER SPACE
011400
```

```
                   SUBROUTINE GETCOEF
000002             COMMON/CONSTA/AREA,RFCOEFF,AREAN,CN,CONST
000002             DIMENSION ITITLE1(10),ITITLE2(10),ITITLE3(10)
000002             DIMENSION IHOLD(132)
000002    10        CONTINUE
000002              READ(4,1000) I
000010    1000      FORMAT(1X,R1)
000010              IF(I.EQ.1R*) 20,10
000015    20        CONTINUE
‖00015    20        CONTINUE
000015              READ(4,1020)ITITLE1,ITITLE2,ITITLE3,NONURB
000031    1020      FORMAT(/////,10A10/10A10/10A10/////58X,I1
                  * //////////////////////)
000031              CALL SUMRAIN
000032              READ(4,1024) AREA
000040    1024      FORMAT(/////25X,F9.2)
000040    35        CONTINUE
000040              READ(4,1026) IHOLD
000046    1026      FORMAT(132R1)
000046             IF(IHOLD(50).NE.1RF.AND.IHOLD(51).NE.1RF) GO TO 35
000060             ENCODE(7,1027,COE)(IHOLD(I),I=75,81)
000074    1027     FORMAT(7R1)
000074             DECODE(7,1028,COE) RFCOEFF
000104    1028     FORMAT(F7.5)
000104              IF(NONURB.EQ.0)GO TO 50
000105    30        CONTINUE
000105              READ(4,1030) KEY
000113    1030      FORMAT(25X,R5)
000113              IF(KEY.EQ.5RAREAN)40,30
000120    40        CONTINUE
000120              READ(4,1050)AREAN,CN
000130    1050      FORMAT(23X,F7.1,3X,F5.2)
‖00130    1050      FORMAT(23X,F7.1,3X,F5.2)
000130              GO TO 55
000131    50        CONTINUE
000131              AREAN=CN=0.
000133    55       CONTINUE
000133              READ(4,1055)KEY
000141    1055      FORMAT(1X,R9)
000141              IF(KEY.NE.9RTREATMENT) GO TO 55
000143              READ(4,1057) KEYTITL
000151    1057      FORMAT(103X,R7)
000151              WRITE(2,1058) KEYTITL
000157    1058      FORMAT(1X,R7)
000157             WRITE(2,1060)ITITLE1,ITITLE2,ITITLE3
000171    1060      FORMAT(3(10A10,/))
000171              WRITE(2,1070)
000175    1070      FORMAT(1X,*NONURB*,10X,*AREA*,3X,*RUNOFF COEFF*
                  * ,4X,*AREAN*,8X,*CN*)
000175              WRITE(2,1080)NONURB,AREA,RFCOEFF,AREAN,CN
000213    1080      FORMAT(6X,I1,5X,F9.2,5X,F7.5,5X,F7.1,5X,F5.2)
000213              CONST=((RFCOEFF*AREA)+(CN*AREAN))/(AREA+AREAN)
000221              WRITE(2,1090)CONST
000226    1090     FORMAT(1X,*CONSTANT= *,F8.5)
000226              WRITE(2,2000)
‖00226              WRITE(2,2000)
000232    2000      FORMAT(1X,*MONTH*,6X,*RAIN(IN)*,1X,*RUNOFF(IN)*,
                  * 7X,*SUSP*,8X,*BOD*,10X,*N*,8X,*PO4*,7X,
                  * *DSET*,3X,*RAIN(AF)*,1X,*RUNOFF(AF)*,
                  * 3X,*DSET(AF)*)
```

```
000232          RETURN
000233          END


GETCOEF

SUBPROGRAM LENGTH
000653

UNUSED COMPILER SPACE
012100


                FUNCTION ACFT(XXX)
000003          COMMON/CONSTA/AREA,RFCOEFF,AREAN,CN,CONST
000003          ACFT=(XXX*(AREA+AREAN))/12.
000007          RETURN
000007          END


ACFT

SUBPROGRAM LENGTH
000022

UNUSED COMPILER SPACE
013400


                SUBROUTINE SUMRAIN
000002          COMMON/ARRY/TRAIN(25,12),YRRAIN(25)
000002          XMORAIN=0.
000003          READ(4,8000)IOLDYR,IOLDMO,RAIN
000015    8000  FORMAT(X,I4,X,I2,104X,F4.2)
          *READ RAINFALL DATA AND SUM FOR EACH MONTH
000015           ISTARYR=IOLDYR
000017    10    CONTINUE
000017    10    CONTINUE
000017          XMORAIN=XMORAIN+RAIN
000021          READ(4,8000)IYR,IMO,RAIN

          *SKIP IF HEADER DATA IS ENCOUNTERED .I.E. YEAR=0000

000033          IF(IYR.EQ.0000) GO TO 40

          *CHECK TO SEE IF MONTH HAS CHANGED

000034    15    CONTINUE
000034          IF(IOLDMO.NE.IMO) 20,10
000041    20    CONTINUE

          *ENTER RRAIN FOR MONTH IN PROPER ARRAY LOCATION

000041           I=IOLDYR-ISTARYR+1
000044          TRAIN(I,IOLDMO)=XMORAIN
000050          YRTEMP=YRTEMP+XMORAIN
000052          XMORAIN=0.
```

```
000052            IOLDMO=IMO

         *CHECK TO SEE IF YEAR HAS CHANGED

000053            IF(IOLDYR.NE.IYR) 30,10
000060   30       CONTINUE
000060            YRRAIN(I)=YRTEMP
000062            YRTEMP=0
000063            IOLDYR=IYR
000064            GO TO 10

         *SKIP HEADER AND CHECK IF RAINFALL DATA IS FINISHED
‖        *SKIP HEADER AND CHECK IF RAINFALL DATA IS FINISHED

000065   40       CONTINUE
000065            READ(4,8010) IYR,IMO,RAIN
000077   8010     FORMAT(////X,I4,X,I2,104X,F4.2)

         *IF YEAR IS EQUAL TO 0000 ON SECOND READ RAINFALL
         *DATA HAS ENDED

000077            IF(IYR.NE.0000) GO TO 15
000100            TRAIN(I,IOLDMO)=XMORAIN
000105            YRRAIN(I)=YRTEMP+XMORAIN
000107   9999     RETURN
000110            END


SUMRAIN

SUBPROGRAM LENGTH
000141

UNUSED COMPILER SPACE
013000
‖13000

AJYQHWI.  23.20.10. 77/02/18.



************************************
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 THIS IS   D I S P O S E D   OUTPUT.

 IT  WILL  NOT  HAVE  A  CARD  DECK.

 PLEASE PUT OUT FOR USER     9364003

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